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THE IRON AGE

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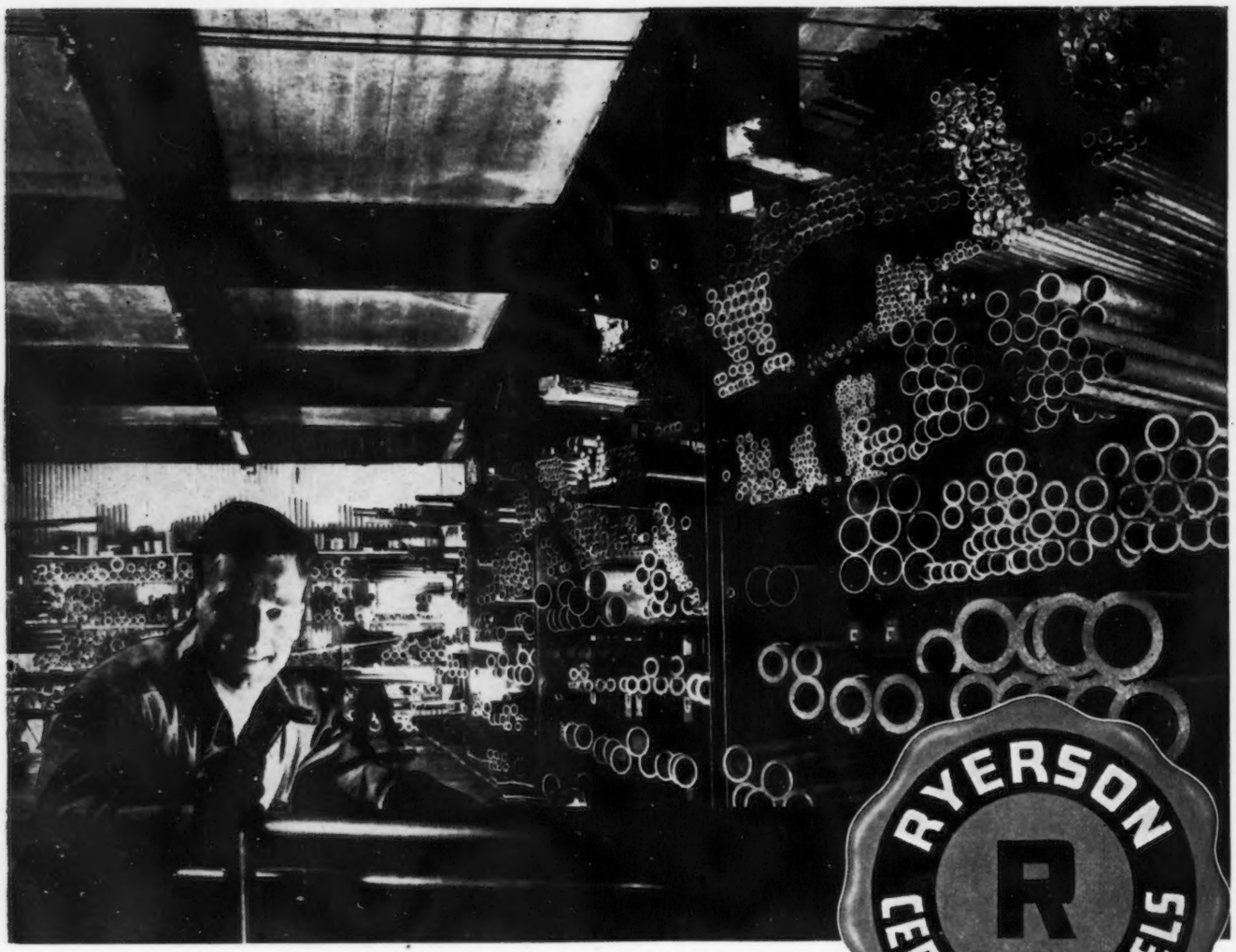

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OCTOBER 27, 1938

ESTABLISHED 1855 Vol. 142, No. 17

Public Opinion in Ashland

LAST Wednesday I had the pleasure of attending Ashland's community celebration, on the fifteenth anniversary of the debut of the first continuous rolling mill.

I wish that our representatives in Congress could have been there to see it too. They would have had an "eye-opener" on two important subjects.

One of these subjects is the effect of mechanization upon employment. And the continuous sheet mill, as you know, has been held up to us, by people in high as well as low places, as being mechanization's number one job destroyer.

Yet here was Ashland, Kentucky, where the first continuous mill was developed and installed, holding a community celebration in honor of the inventor and perfecter of the continuous mill, J. B. Tytus, of the American Rolling Mill Co.

Ashland's population, before it was exposed to the company of this supposed job destroyer was about 15,000. Now it is over 30,000. And over 20,000 participated in the ceremonies.

Fifteen years ago you could not have gotten such a congregation of people together because they were not there to get. The continuous mill doubled the population, doubled employment and more than doubled wages in this Kentucky city, where it has been at work longer than anywhere else.

And the people who live and work in Ashland must have known and appreciated these facts, or they would not have closed their stores and schools and assembled in such imposing numbers.

Fact number two that our Congressmen could have learned at Ashland concerns public relations. When practically a whole community takes a day off to pay honor to a company and its accomplishment, there cannot be much the matter with employer-employee relations. True, the twenty CIO employees who induced the Labor Board to put Armco on trial at Ashland at a cost of $1000 a day were not present. Nor were the Labor Board examiners. Perhaps they did not want to be exposed to the subversive influence of seeing what 90 per cent of the Armco workers and their families think of the company's employee relations. That would be far too one-sided to give comfort to troublemakers.

J. H. VanDeventer

Renewed Confidence Dominates

THE increasing throb of industrial activity, rising automobile production, restoration of General Motors pay envelopes to last year's levels and re-hiring of 35,000 automobile workers were part of an upward spiral that attended last week's record breaking National Metal Congress held in Convention Hall, Detroit.

The Congress, and its attendant exposition which occupied more than four acres of floor space, broke all records of attendance, number of exhibitors, volume and quality of technical papers and general interest. As many visitors toured the exposition in its two opening days as in the whole session a year ago, and final attendance figures were estimated at more than 25,000.

At 50 or more technical sessions, scientists, engineers and industrialists joined in planning for progress. Their enthusiasms for the task in hand were stimulated by the favorable tide of business events, and confidence was renewed by such an authoritative statement as that of B. F. Fairless, president of U. S. Steel Corp., who said at the annual A.S.M. banquet, "Reports emanating from various sources permit one to harbor a measure of optimism. . . . Industries are contributing reports and forecasts which offer words of cheer."

The technical sessions and exposition culminated many months of planning by the participants in this twentieth annual event—the American Society for Metals, the American Welding Society and the American Institute of Mining and Metallurgical Engineers.

Along the aisleways at the exposition itself, there was a wealth of new sights to be reported. Hours spent on the floor amid the million dollars' worth of exhibitions meant notebooks crammed with data. Lack of space precludes summarizing all of them, or even hinting at the infinite number of applications. But there were many outstanding ones such as, for instance, the high frequency converters and coils which promise to give industry a surface hardening process that is faithful to contour, and the new duPont high-speed process for heavy deposition of really bright copper, two of a score of exhibits which were thronged day and night.

Quenched spark gap conversion of electric current to amazingly high frequencies for hardening materials by induction—and for other work in heating metals—was demonstrated in simple applications by the Lepel High-Frequency Laboratories, Inc., New York. Egbert von Lepel in 1908 devised equipment of this type and saw it used in radio telegraphy, then adapted it for the conversion of electrical energy into heat. The Lepel exhibit featured equipment which requires cleaning and resetting of the spark only after 500 to 700 hr. use. Frequencies upwards of 50,000,000 cycles per minute are attainable. Induction heating equipment now in general use requires use of a motor-generator set and the current produced has a frequency of about 2000 cycles per minute.

During the week the Ohio Crankshaft Co., Cleveland, staged demonstrations of gear hardening with its initial machine of this type. Great "contour accuracy" was shown on the setup, assigning hard-cased gears with the centers, or cores, untreated and retaining the original toughness and machineability of the material. Plugged into 60 cycle current, the machine converted and operated at 200,000 to 300,000 cycles and brought sample parts to temperature in 5 to 10 sec. Along with demonstrations of crankshaft and camshaft hardening by the Tocco induction process, the same firm "went into mass production" when it began the hardening of Packard cam-

Annual Dinner Meeting of American Welding Society

Record Metal Congress

shafts and all of Packard's transmission mainshaft requirements each day on the exhibit floor. Production of 135 shafts per hr. was maintained throughout the day. Three sections along the shaft were surface hardened to Rockwell "C" values of 61, 50 and 55, respectively.

Bright copper deposition in commercial thicknesses—not flash deposit—was plated at a speed four times greater than with existing alkaline plating methods by a new process developed by duPont. High temperatures and a highly concentrated copper cyanide bath account for the speed. it was stated, and new addition agents result in bright, smooth surfaces. Efficiency at the anode and cathode is said to be 100 per cent, compared with 20 to 50 per cent usually found with commercial solutions. Heavy copper depositions are sought to save on the amount of nickel required. Also attempts are being made to produce copper-clad wire very rapidly by this method. Another hoped-for result is the use of such heavy platings for corrosion resistant vessels to hold acid rinse waters, etc., where lead, zinc and similar materials are not suitable.

For cleaning bright nickel and chromium plate, Oakite Products, Inc., New York, demonstrated a newly developed material with a chromic acid tolerance 20 to 30 times greater than

Annual Dinner Meeting of American Society for Metals

materials previously used for cleaning in connection with this type of work.

Of particular interest also was the 2400 deg. F. Char-Mo atmospheric furnace particularly adaptable for treating molybdenum-tungsten tool steels. This is a development of the Surface Combustion Co., Toledo. A display which attracted interest to Linde Air Products Co. was its announcement of a revolutionary electric welding method called the Unionmelt process. At the exposition, American Rolling Mill Co., exhibited Armco ZINCGRIP, a new galvanized sheet metal which withstands severe forming and moderate drawing successfully.

WILLIAM P. WOODSIDE, vice president of Climax Molybdenum Corp., Detroit, elected president of American Society for Metals, succeeding Dr. George B. Waterhouse.

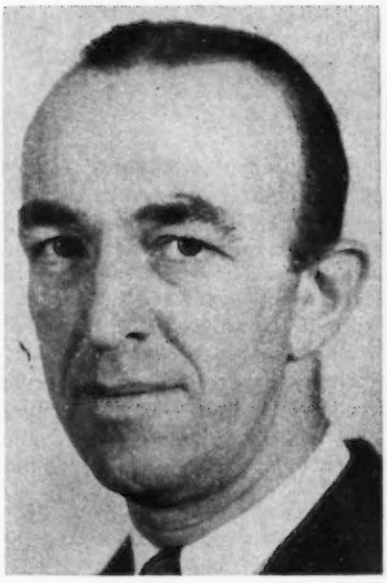
JAMES P. GILL, of the Vanadium-Alloys Steel Co., Pittsburgh, elected vice-president of the A.S.M. He resigned his post as trustee to take the new office.

H. C. BOARDMAN, research engineer, Chicago Bridge & Iron Co., elected president of the A.W.S.

At the annual banquet of the American Society for Metals in Hotel Statler, at which attendance was over 700, a dispassionate approach to the problems and troubles of industry which are susceptible to fact-finding and cold analysis was urged strongly by Mr. Fairless, the speaker. Among the problems he mentioned were length of work week, distribution of gross income of the business, unemployment, and size as a factor in industry.

"All industry would be less perplexed," Mr. Fairless said, "if it could know with reasonable certainty, whether the social well-being, as well as the economic health of large masses of people could be better served by a 30, 36 or 40-hr. working week.

"It would be gratifying to know, if possible, how the gross income of a business should be equitably apportioned among the different interested elements, particularly with respect to the workers, the stockholders, and the tax collector," he said.



DR. J. C. HODGE and C. R. SADLER, recipients of the J. F.

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THE U. S. Steel Corporation's technicolor movie, "Steel-Man's Servant," is seemingly ever popular. The theatre at last week's Metal Congress was packed for each 30 min. performance.

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W. H. EISENMAN, national secretary A. S. M. for another two-year term.

BRADLEY STOUGHTON re-elected treasurer of the A.S.M.

ceived the Henry Marion Howe medal and certificate jointly for the best technical paper to appear in A.S.M. Transactions during 1936-1937. The title was, "Some Factors Affecting Plastic Deformation of Sheet and Strip Steel and Their Relation to Deep Drawing Properties."

In the elections of the American Society for Metals, results included selection of WILLIAM P. WOODSIDE, vice-president of Climax-Molybdenum Corp., Detroit, as president to succeed DR. GEORGE B. WATERHOUSE. JAMES P. GILL, of the Vanadium-Alloys Steel Co., Pittsburgh, was elected vice-president of the society and resigned his post as trustee to take this office. W. H. EISENMAN was re-elected na-

both of the Babcock & Wilcox Co., joint Lincoln Award of the A.W.S.

basis, the approximate vertical and horizontal dimensions at which a significant change in category takes place, what actually determines whether a business enterprise is good or bad, from the standpoint of the public welfare."

Following Mr. Fairless' speech, Dr. E. C. Bain was awarded the past-president's medal, and a certificate of appreciation was given to A. L. Boegehold, Campbell Memorial Lecturer. The Albert Sauveur Achievement Award for pioneer work in metallurgy was then presented to H. W. McQuaid of Republic Steel Corp. Joseph Winlack and Ralph W. E. Leiter, both of Edward G. Budd Mfg. Co., re-

COL. G. J. JENKS, chief of technical staff, Ordnance Department, U. S. Army, and first vice-president of A.W.S.

At another point he said that as long as the unemployment problem persists, purchasing power in the aggregate is diminished and all branches of industry are affected.

As to corporate size as a factor in industry, Mr. Fairless remarked, "Questions have been raised as to the relative merits of large and of small units. It would be useful to know whether there is a standard or rule by which one might determine, on a factual

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DU PONT'S new system of rapid electroplating of bright copper holds the attention of a group of convention visitors.

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B. L. FAIRLESS (left), principal speaker at the A.S.M. banquet has some conversation with E. C. Bain (center), past president, and Dr. G. B. Waterhouse, retiring president of the A.S.M.

tional secretary for a two-year term, and FRANCIS B. FOLEY, DON S. CLARK, and S. L. HOYT were elected to the board of trustees, the latter to fill the vacancy occasioned by Mr. Gill's resignation. BRADLEY STOUGHTON remains as treasurer of the society.

The record program of the American Welding Society was launched with the presentation of awards for outstanding contributions. More than 800 members registered for the convention and participated in its sessions.

The Samuel Wylie Miller Medal was awarded to JOSEPH WALKER MEADOWCROFT, assistant works manager, Edward G. Budd Mfg. Co., Philadelphia. As an inventor, Mr. Meadowcroft was cited for his material contributions to the advancement of the welding art. He is regarded as a pioneer in the fabrication of all-steel automobile bodies. A charter member of the A.W.S., a past-president and a director, he has also been a generous contributor of technical papers and discussions. DR. H. L. WITTEMORE, chief of the engineering mechanics section of the Bureau of Standards, as chairman of the society's board of awards, presented the medal.

The J. F. Lincoln Award was made to DR. JAMES HODGE and CORNELIUS R. SADLER, both of the Babcock & Wilcox Co., for their joint paper on the "Weldability and Properties of Materials for Casing Strings," published in the society's *Journal* of May, 1938.

Election of A.W.S. officers resulted in the naming of H. C. BOARDMAN, research engineer, Chicago Bridge & Iron Co., president; COL. G. J. JENKS, chief of technical staff, Ordnance Department, United States Army, Washington, first vice-president, and TURNER C. SMITH, General Petroleum Corp., Los Angeles, second vice-president. C. A. MCCUNE, secretary, Magnaflux Corp., New York, continued as treasurer.

District vice-presidents are: DR. W. F. HESS, head of the welding laboratory, Rensselaer Polytechnic Institute, Troy, N. Y., for New York-New England; W. W. PETRY, Cincinnati Milling Machine Co., Middle-Eastern; K. L. HANSEN, consulting engineer, Harnischfeger Corp., Milwaukee, Mid-West district.

Directors-at-large are: DR. C. A. ADAMS, consulting engineer, Edward

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LOOKING toward the central Republic display at Convention Hall. At the extreme left is Mr. Tran, of Ohio Crankshaft Co., explaining the new high-frequency hardening of gears.

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G. Budd Mfg. Co., Philadelphia; MARVIN CORK, Humble Oil & Refining Co., Houston, Tex.; F. T. LEWELLYN, U. S. Steel Corp., Pittsburgh, and C. E. WOODMAN, Kansas City Bridge Co., Kansas City, Mo.

W. J. CAMERON, of the Ford Motor Co., was the principal speaker at the annual banquet Thursday night in the Book-Cadillac Hotel. Between 460 and 500 persons attended.

With a total registration exceeding 500, the Iron and Steel and the Institute of Metals division of the American Institute of Mining and Metallurgical Engineers joined hands for their annual dinner Tuesday night in the Hotel Book-Cadillac. WILLIAM B. STOUT, president of Stout Engineering Laboratories, Inc., addressed them. "Technical knowledge and the growth of facts are international," said Mr. Stout. "They cannot be held from any one people. I hold that technical knowledge will be the basis for the next great development in human affairs."

Mr. Stout continued to say that airplane engineering, because of the exactitude it requires, had led to important innovations in railroad and automobile designing and other fields. A recent contribution from principles learned in airplane construction has been the development of a practical housing unit for low-income families, he said.

Describing the immense strides taken recently in airplane designing, he said that current developments foreshadowed profitable as well as practical flying in 100-passenger ships weighing 225,000 lb., capable of crossing the Atlantic with ease and of weathering any storm.

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Year's Progress Interpreted By A. S. M.

WITH over 40 technical papers, eight educational lectures, and a couple of round table discussions to choose from, the average American Society for Metals member in "Dynamic" Detroit last week had, if anything, just a little more than he could handle. Subjects covered ranged from almost theoretical abstractions to some of the most recent and most useful of technical developments.

Undoubtedly the highlight of the technical program was the 1938 Edward de Mille Campbell Memorial Lecture, presented by Alfred L. Boegehold of the General Motors Research Laboratory. Mr. Boegehold's presentation covered, "Some Unusual Aspects of Malleable Iron Melting."

Fifteen years ago most of our malleable iron was melted in air furnaces. For the general run of automotive castings it was necessary to hold the carbon not over 2.60 per cent and the silicon not over 1.00 per cent in order to obtain a white fracture in all castings. Even when composition was held within this range, according to the author, fracture tests had to be made on every heat to be sure that the iron showed a fracture sufficiently free from primary graphite to make good malleable iron after annealing. Without knowing why some heats of the proper composition showed too much or too little tendency to form primary graphite in the form of mottles, the metallurgist could always make the necessary adjustments in composition to get the desired fracture.

Mr. Boegehold's experiment consisted of an attempt to make some alloy malleable iron in a high frequency induction furnace with a composition which by comparison with the production iron should have been white in a 2 in. round section. The fracture of this iron in a 2 in. round, however, was not white nor even speckled, but all gray. The same result was obtained when a melt was made with the same composition as the production metal. This experience convinced him that the knowledge as to principles governing carbide retentivity in iron was sadly lacking. Without being able to duplicate production results in laboratory melts, it would be impossible to develop alloys in the laboratory that could be used in production. It became obvious, therefore, that these principles would have to be discovered before proceeding with the development of alloy malleable iron.

In most of the experiments the results obtained were not in agreement with expectations. The use of conventional measures reputed to produce white fracture did not have that effect. In a few instances the results appeared to indicate that treatment of the metal with moisture either as steam, or as water vapor in air, resulted in increased carbide retention. This was particularly true in the case of steam additions and also where the moisture

was carried in with hydrogen in an experiment not described below.

As a result of his tests Mr. Boegehold collected evidence to make him appreciate the wisdom from now on of regarding the production of hard iron for making malleable iron more carefully from the standpoint of the influence of water vapor and that of contamination of solid iron oxide. If an attempt is made to explain the mechanism of these two influences one is confronted with the thought that iron oxide is probably the active ingredient in both cases. In one form, it causes carbide stability, and in another it causes graphitization. A difference that might be pointed to is that the oxide formed as a result of moisture decomposition probably forms a different kind of oxide than that formed by air when molten iron is solidifying and cooling from the freezing temperature.

It was pointed out also by Mr. Boegehold that nascent hydrogen formed when water decomposes may play some part in the stabilizing effect. The problem is no doubt very complicated and probably has to do with whether oxides or silicate slags are dissolved or whether they are out of solution and if they are out of solution whether they are molten or solid. It may also involve differences in solubility or reaction of the different forms of iron oxide. Mr. Boegehold said that that part of the problem must be left to some one who will take these phases one at a time and set up carefully controlled experiments to get satisfactory answers. For the present, it was said that one must be content to know what practical results may be obtained. The findings of Mr. Boegehold's work apply not only to the production of white iron for conversion to malleable iron but also to the production of high strength cast iron. The same influences must be taken into consideration in induction furnace melting of gray iron. It was predicted, therefore, that experimental melting in high frequency furnaces will yield more useful results if careful control of the atmosphere surrounding the furnace charge and of the condition of casting ladles is maintained. The importance of being able to obtain white iron with a high carbon plus silicon content obviously resides in the shorter time required for annealing.

CONVENING in simultaneous sessions Monday morning at the Hotel Statler, A.S.M. members heard seven highly important papers on the hardening process and on the subject of hardness itself.

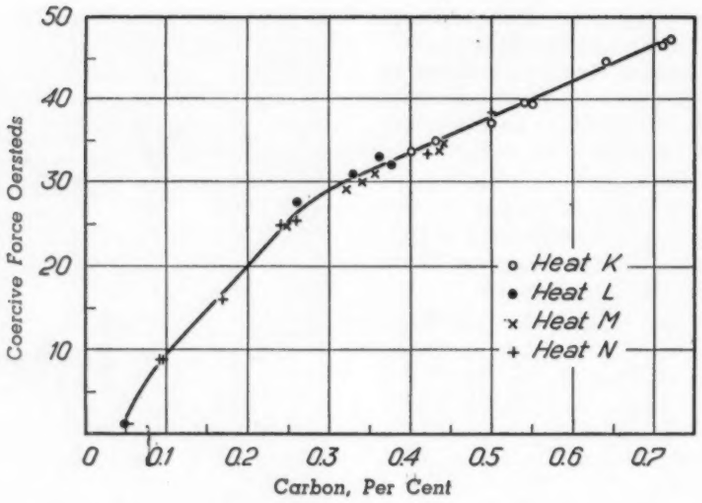


FIG. 1.—Coercive force-carbon content curve for steel samples cast in the laboratory.

One paper, "Softening Rate of a Steel When Tempered from Different Initial Structures," by E. H. Engel, Carnegie-Illinois Steel Corp., dealt with the softening characteristics of a typical carbon steel, containing 0.94 per cent carbon and 0.40 per cent manganese, when heat treated to four different initial structural states and thereafter tempered for a period ranging from two seconds to 22 hr. at five different temperatures: 600, 900, 1050, 1200, and 1300 deg. F. The four initial states were martensite, bainite, fine nodular pearlite, and coarse pearlite.

In general, the larger the size of the carbide particles in the initial structure, the lower is the rate of softening during tempering. At any given temperature, according to the author, the coarse lamellar structure softens most slowly, and after short times at the higher temperatures this structure is even slightly harder than the martensite similarly tempered. At the lower temperatures the difference in hardness, in terms of Brinell number, between martensite and bainite is nearly independent of tempering time after a brief initial period. The fact that the two curves are nearly parallel, when time is expressed on a logarithmic scale, does not imply that bainite and martensite soften identically for equal time intervals. At the higher temperatures the four tempered structures approach a common hardness, which gradually decreases with increased tempering time.

"Selective Hardening with the Oxy-Acetylene Flame," was described in an interesting manuscript by R. L. Rolf, Lakeside Steel Improvement Co. Mr. Rolf pointed out that in making possible the surface hardening of parts heretofore considered impractical from a standpoint of size, shape or economy, the oxy-acetylene flame has provided the metal working industry with a new tool. His paper discussed this process and data were given on suitable steels and on methods and equipment employed.

In the paper, "Reaction to Annealing Above the Eutectoid Temperature of Quenched Hypereutectoid Steels," the authors, R. Austin and M. C. Fetzer, Pennsylvania State College, pointed out that a series of hypereutectoid steels of similar chemical composition had been shown, in previous researches, to react in a markedly different manner, with respect to spheroidization, graphitization and softening, on prolonged tempering of the hardened steels at temperatures below the eutectoid transformation.

The investigation, described last week, outlined the reaction of these steels to prolonged annealing at temperatures extending from slightly above the eutectoid inversion to above the limit of complete solubility of all the carbon present in the steels. The factors considered related principally to graphitization, nature and distribution of excess carbides, columnarization of ferrite grains occurring during surface decarburization and fracture grain size of the steels obtained on quenching the annealed specimens.

In contrast to the behavior at subcritical temperatures, graphitization above the critical was shown by Austin and Fetzer to correlate with chemical analysis of the steel. Fracture grain size tests in conjunction with metallographic studies indicated that angular carbides are associated with fine grain size, and that a change in shape to the

spheroidal form is accompanied by an increase in fracture grain size. The greater the metallic aluminum content the greater the reluctance of the steels to develop a coarse grain. The tendency for columnarization of the ferrite which occurs during decarburization was shown to correlate with grain growth in adjacent austenite.

O. W. Ellis and J. E. McDonell, of Ontario Research Foundation and Queens University respectively, in their paper, "Effects of Fiber on the Notch Toughness of Mild Steel as Influenced by Cooling Rate," described experiments having for their object the determination of the effect of cooling rate and actual grain size on the notch-toughness of a steel in directions transverse and parallel to the direction of its rolling. An attempt was made, by the two men, to explain the results of these experiments, the suggestions being made that the reduction in the notch-sensitivity of this steel brought about by quenching is due largely, if not entirely, to an increase in its cleavage strength and that the effects of fiber in this steel must be to reduce its resistance to plastic flow rather than to alter its cleavage strength.

A paper from the Pittsburgh Bureau of Mines, with B. A. Rogers, K. Wentzel and J. P. Riott as authors, described a highly interesting, "New Method for the Rapid Determination of Carbon in Samples of Plain Carbon Open-Hearth Steel."

This new method was developed for the determination of the amount of carbon present in samples of plain carbon steel taken from the open-hearth furnace. This method depends upon the measurement of the coercive force of small ingots of killed metal poured from a sampling spoon. The magnetic measurements are made in a coercimeter which is a very simple device for determining this particular magnetic property. In practice it is sufficient to measure the coercive current and in this report the relationship between coercive current and carbon content is shown by means of a graph. As an example of the type of curve obtained with this equipment, note the excellent correlation of experimental results in Fig. 1. Most of the points are within 0.01 per cent, and only two of them lie farther than 0.02 per cent carbon from the curve.

IN the Tuesday morning session, the paper, "Influence of Chromium, Silicon and Aluminum on the Oxidation Resistance of Intermediate Alloy Steels," by A. E. White, C. L. Clark and C. H. McCollam, presented the results of an investigation undertaken to determine the influence of chromium, silicon and aluminum on the oxidation resistance of intermediate alloy steels. It was shown that through the proper combination of these elements a high degree of oxidation resistance can be obtained at temperatures as high as 1500 to 1750 deg. F.

Both silicon and aluminum were found to be more effective than chromium in imparting oxidation resistance provided chromium was likewise present. In fact the experimental findings indicated silicon to be seven times and aluminum four times as effective as chromium under the given test conditions.

Chemical and microscopic examination of certain of the scaled specimens substantiated the theory that the increased oxidation resistance produced by the addition of these elements is caused by their increased concentration as oxides in the inner scale layer which becomes impermeable and adherent to the surface of the steel.

In the same session, J. A. Duma, of Norfolk Navy Yard, in his paper, "Influence of Aluminum on Cast Corrosion Resisting Steel," described some of the alloying effects of 0.08 to 3.00 per cent aluminum on the mechanical and corrosion properties of cast 20-10 corrosion resisting steel. The effect on mechanical properties was studied with tensile, bend, hardness, and impact tests. Corrodibility was tested in four of the common corroding media, namely: boiling 67 per cent nitric acid, 4 per cent sea salt spray, tide river water, and 10 per cent ferric chloride solution. An oxidation test was also performed. Photographic evidence regarding the effects of aluminum on both the macro- and microstructures of this metal was presented by Mr. Duma, and studies of the response to heat treatment of aluminum-bearing corrosion resisting steel were likewise included.

Within the past ten years the use of molybdenum high speed steel has been steadily increasing, and therefore the paper, "Development in Molybdenum High Speed Cutting Steel," by W. R. Breeler, of Ludlum Steel Co., was particularly timely. Mr. Breeler stated that the most popular analysis at the present time is: Carbon 0.72 to 0.81, silicon 0.20 to 0.45, manganese 0.30 maximum, chromium 3.50 to 4.00, tungsten 1.30 to 1.80, vanadium 0.90 to 1.30, molybdenum 8.00 to 9.50. When this steel was first introduced several objections were raised, according to Mr. Breeler, the main one being the tendency to decarburize more than 18-4-1. Numerous modified compositions were developed in an attempt to overcome these objections. The most important of these new steels were listed by Mr. Breeler and discussed from the standpoint of manufacturing decarburization, and cutting ability. The attempt to produce a better steel involved the use of copper and boron or both, omitting tungsten and substituting vanadium, and changing the ratio and amounts of tungsten and molybdenum.

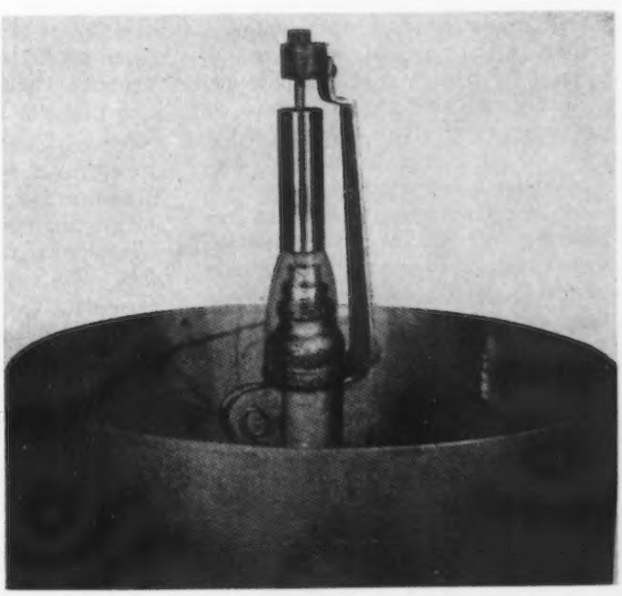


FIG. 2.—Test piece and adapter hung on fixture so that water can be sprayed on the bottom face.

THE A.S.M. members at the Tuesday morning simultaneous session heard Erich Fetz, of Wilbur B. Driver Co., discuss "A New 70/30 Nickel-Copper Alloy Subject to Precipitation

Hardening." Mr. Fetz mentioned the various types of 70/30 nickel-copper alloys rendered subject to precipitation hardening by the addition of one or more elements.

He also mentioned his former research work on copper-nickel-tin and showed how this was extended to the 70/30 nickel-copper composition. The precipitation hardening effects in this alloy in relation to rising tin additions up to 20 per cent, to aging temperature and to time up to 1000 hr. were investigated. The capacity of tin-containing 70/30 nickel-copper for plastic deformation and the softening characteristics of pure, cold-worked, 70/30 nickel-copper were described in conjunction with the problem of superimposition of strain hardening and precipitation hardening effects.

C. G. Goetzel, of Hardy Metallurgical Co., in the same session described in his paper, "Some Properties of Oxygen-Free High Conductivity Copper (OFHC)," and how test specimens for density, hardness, tension, compression, impact, fatigue, electrical conductivity, and structure tests were prepared from two small OFHC castings. Tension, conductivity, and fatigue tests were made on as-cast material and on wires, rolled and drawn from bars cut from the castings. Density, hardness and structure tests were made on as-cast OFHC and on samples which were compressed in a steel die after separation from the casting.

Tension tests showed uniform results, independent from the location of the specimens in the casting. Compressive strength properties were uniform; odd shapes of the specimens after testing were traced back to the location of the cylinders in the original casting.

The influence of the die compression was very slight with respect to density, but marked with respect to hardness. The hardness values, however, did not reach heights of strain hardened copper. The die compression did not affect the macrostructure.

Conductivity tests gave slightly higher results than expected. They showed a considerable increase after annealing of the wires. Impact tests had inconsistent results and showed the influence of the location of the test bars in the original casting. Fatigue tests, according to Mr. Goetzel, on as-cast material resulted in a S-N curve much lower than the one known for hard drawn solid OFHC, whereas the curve for hard drawn OFHC wires is only slightly below the curve for hard drawn solid material.

AFTER a luncheon with the Canadian Chapter at the Hotel Statler, the A.S.M. members gathered in the afternoon at Convention Hall to hear another group of papers.

R. E. Cramer and E. C. Bast, of University of Illinois, presented in, "The Production of Flakes by Treating Molten Steel with Hydrogen and the Time of Cooling Necessary to Prevent Their Formation," a brief review of recent literature on flakes in steel, which showed that many metallurgists are associating the development of flakes with the presence of hydrogen in the steel.

One recent experiment was described in which large ingots of open hearth steel were treated with hydrogen, and "control specimens" rolled from these ingots which developed many flakes. A system of experimentally slow cooling other specimens from the same bars gave information on the time of cooling necessary to prevent the formation of the flakes, and the temperature at which the flakes formed. Conclusions were drawn which would apply only to the bars used in this experiment.

In the same session, W. Crafts and J. L. Lamont, of Union Carbide and Carbon Research Laboratories, Inc., described "Some Effects of Deoxidizers in Low Carbon-1.5 Per Cent Chromium Steel." In order to determine the reason for differences between the properties of similar fine-grained steels, the "core" properties of 1.5 per cent chromium carburizing steels treated with graduated amounts of aluminum, vanadium, and zirconium were investigated. Using the tensile strength and the distortion of a tuning fork type of specimen as criteria of hardening characteristics, it was shown that the differences in properties result from changes in the mode of transformation of austenite. The amount and kind of deoxidizer were found not only to have an appreciable influence over the austenite transformation in one section, but also to determine the differences between light and heavier sections. More accurate control and more desirable combinations of properties were, therefore, shown to be obtainable by accurate control of the residual deoxidizer content and the use of combinations of deoxidizing elements.

A. L. Boegehold, of General Motors, presented his Campbell Memorial Lecture Wednesday morning before a very large audience composed of A.S.M. members and members of cooperating societies.

ON Wednesday afternoon the technical meetings again were transferred to Convention Hall. H. A. Schwartz and M. K. Barnett, of National Malleable & Steel Castings Co., in their paper, "Graphitizing Rate and Nodule Number," described how they investigated the question whether graphitizing rate is proportional to nodule number. Only a qualitative confirmation was obtained. In general graphitizing rate was shown to increase as a fractional power of nodule number except under conditions so controlled that only moderate variations in nodule number are possible.

At the same session, H. F. Kaiser and H. F. Taylor, of the Naval Research Laboratory, presented a paper, "Effect of Type of Cold Deformation on the Recrystallization Properties of Armco Iron." The recrystallization of Armco iron when cold deformed by torsion, elongation in tension, and rolling, and subsequently annealed, was studied, care being taken to keep variables other than the type of deformation as alike as possible. From the data in each case a recrystallization diagram was constructed. It was found possible to relate the critical degree of deformation at any chosen annealing temperature for the three different types of cold deformation by expressing the degree of deformation either in terms of specific shear or better (following Nadia), in terms of octahedral shear. Experiments on the effect of time of anneal were also carried out.

In one of the two simultaneous sessions Thursday morning at the Hotel Statler, F. N. Rhines and Cyril Wells, of Carnegie Institute of Technology, described "The Influence of Microstructure Upon the Process of Diffusion in Solid Metals."

It was pointed out that studies of structural changes accompanying diffusion, anisotrophy of diffusion, and integranular diffusion had been made using previously published and new data. The methods used in obtaining these data were also discussed.

Columnar grains form in systems involving a phase change, according to the authors. Recrystallization, grain growth, and twinning may be induced in a single phase by diffusion if the specific volume changes caused by a movement of solute are sufficiently large.

Previous investigators have presented considerable more evidence of an

anisotropy in non-cubic than in cubic metals. New evidence of an anisotropy of diffusion in cubic metals (copper-zinc system) was given and it was shown that anisotropy may depend on the concentration of solute.

Intergranular diffusion in metal systems seems to be faster than intragranular diffusion. Contrary to the belief of many, it has been shown that carbon does not diffuse faster through gamma iron grains than along the grain boundaries.

AT the simultaneous morning session, Carl L. Shapiro had a paper entitled, "Color Carbon and Aging." Part I of this paper discussed the effect of thermal and mechanical treatment upon the size of the iron-carbide particles by means of the color carbon test, which is a colorimetric method of determining the relative size of the iron-carbide particles. It presented a brief historical development of color carbon and then proved that "missing" and "excess" carbon are due to the variation in the size of the iron-carbide particles.

The effects of aging upon the iron-carbide particle size were also studied by the color carbon test, which showed that aging after thermal or mechanical treatment results in an increase of coloration or carbide particle size. These findings indicated that aging in carbon steels should be attributed to carbon (carbide) and is a precipitation, and test showed that the aging characteristics of a steel are influenced by its structural composition and the degree of mechanical deformation.

Part II described the aging of the various aggregates formed in steel and presented the cause of aging in these aggregates after defining the different types of aggregates and aging. It revealed that the aging characteristics of the aggregates vary and that aging in general is controlled by: (1) the amount of retained austenite, (2) the amount of carbon dissolved in alpha iron, (3) the size of the iron-carbide particles, (4) time and temperature of tempering and (5) the degree of mechanical deformation remaining within or conferred upon the steel after the final heat treatment.

Part II of Mr. Shapiro's paper also showed that martensite is structurally of two types, (1) the acicular and (2) the spheroidal. It further revealed that aging converts the acicular type of carbide structure to the spheroidal form.

In the same session H. F. Kaiser, in his paper, "Possible Uses of Radioactive Substances in the Testing of Metals," stated that radioactive substances, in the capacity of indicators, have found much use in several fields of research. Mr. Kaiser's paper represented an attempt to estimate the possibilities and also the limitations in the use of radioactive indicator substances in the detection of defects in metallic materials and parts. Some preliminary experiments in this direction were described.

THE afternoon session at Convention Hall was devoted to papers on hardenability. R. F. Mehl, of Carnegie Institute of Technology, in his paper, "Physics of Hardenability. The Mechanism and the Rate of Decomposition of Austenite," gave a discussion of the mechanism by which the decomposition products of austenite form, of the nature of these products, and of the factors which determine the rates of decomposition at different temperatures. An analytical expression for the isothermal reaction curve for the formation of pearlite was also given, based on the formation of nuclei at the grain boundaries of austenite and radial growth from these nuclei; this permitted conclusions to be drawn concerning the effect of austenite grain size, of rate of nucleation and of rate of growth upon the form of the isothermal reaction curve, and afforded methods by which rates of nucleation and rates of growth may be approximated. Data on rates of nucleation and on rates of growth were found to be in accord with theory.

The variation in the interlamellar spacing in pearlite with temperature and the variation in the diffusion coefficient of carbon in austenite with temperature may be used to predict a rate of growth increasing with decreasing temperature. The variation in interlamellar spacing with temperature may also be used to predict the maximum rate of formation of pearlite at 150 deg. C. below A_{r_1} and the cessation of the formation of pearlite at this temperature. It was proposed by Mr. Mehl that pearlite is nucleated by cementite and that the structure bainite, formed at slightly lower temperatures, is an aggregate nucleated by ferrite. The effect of alloy content on the rate of growth was considered on the basis of the rates of diffusion of carbon and of alloying elements in austenite, and of their mutual effects; diffusion data were given which show that the presence of alloying elements does not affect the rate of diffusion of carbon and which showed therefore that the retarding of the rate of growth by alloying elements is caused by the necessity for and the slow rate of diffusion of the alloying elements. It was suggested that the dark acicular structures formed at temperatures between 400 and 200 deg. C. differ from martensite only in the fact that the tetragonal lattice characteristic of martensite decomposes during the reaction at a rate which rapidly increases as the temperature is raised.

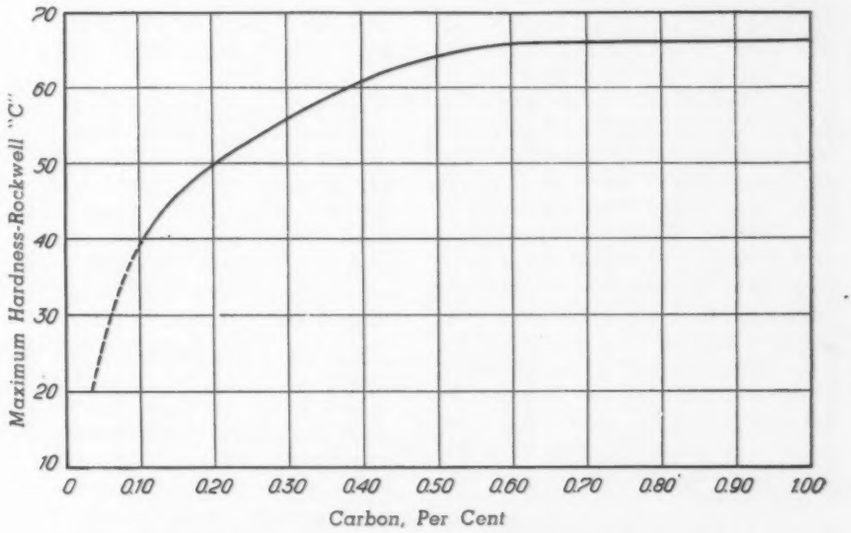


FIG. 3.—The maximum hardness that can be attained for the carbon content of a steel provided no austenite is retained, critical cooling rate is exceeded and the carbon is in solution in the austenite before quenching.

An analytical expression was given by Mr. Mehl which provides for the decrease in rate between 400 and 200 deg. C. for the minimum rate at 200 deg. C. and for the increased rate at lower temperatures.

In his paper, "Hardenability Tests," W. E. Jominy, of General Motors Corp., showed that there is no nationally accepted standard for measuring the hardenability of steel. In the tool steel field the test which comes nearest to general acceptance is perhaps the Shephard PF test. The more commonly used hardenability tests were described with their particular advantages and limitations. The test described by A. L. Boegehold and Mr. Jominy last year for carburized steels has now been applied to medium carbon steels. Since this application was described for the first time in the paper, considerable detail regarding its use were included. By using this test it is possible to determine what the hardness would be at the center of a bar 4 in. round after quenching in oil or water although the test sample itself is only 1 in. in diameter by 3 in. long. It is also possible to determine the center hardness of a 3-in. round bar or a 2-in. or for any size from 4 in. down to 0.5 in. in diameter, whether quenched in oil or water, by this test. Cooling rates of various magnitudes are obtained along a test specimen by spraying water at 75 deg. F. into the cupped end of the specimen bar. The cooling fixture employed is shown in Fig. 2.

In a paper "The Effect of the Silicon and Aluminum Addition on the Hardenability of Commercial Steels," M. J. R. Morris and H. W. McQuaid, of Republic Steel Corp., described the theoretical side of the relative effects of small aluminum and silicon additions on the response to heat treating of commercial carbon steels of the medium carbon type. It was indicated that the real causes of variation in properties of this type of steel after quenching are not at present known.

The reason for the effect of the aluminum addition was discussed. The relation between the physical size of the austenite grain at the time of quenching and hardenability was thought to be less important than low carbon austenitic areas which are present due to nonuniform carbon solution and diffusion.

ON the last morning of the meeting, Friday, M. A. Grossmann, M. Asimow and S. F. Urban, of Carnegie-Illinois Steel Corp., gave a paper, "Hardenability, Its Relation to Quenching, and Some Quantitative Data." Part I of this paper stated that since the hardness distribution in a quenched bar depends both on the hardenability of the steel and on the severity of the quench, it is necessary in any quantitative treatment to distinguish between the two effects. It was shown that the value of hardenability tests is not by any means restricted to the hardness distribution obtained, but that the results may be made to reveal, in numerical values, the severity of the quench that was employed.

A mathematical analysis was used to discover a probable pattern of behavior, when using different quenches with steels of various hardenabilities, and the method selected gave values which accord closely with values found in quenched bars.

These principles make it possible to judge the true hardenability of the heated steel, which is independent of the severity of the quench. It also becomes possible to compare the results obtained by different laboratories, because the results reveal the severity of the quench employed in each case, as well as the hardenability.

Further, one may predict the hardness distribution which will be obtained in any size of quenched bar, once the hardness distribution in one appropriate size is known, and the severity of the quench known. One is also enabled to predict the hardening for any know quenching conditions, provided only that the hardening of the particular steel is known for one set of quenching conditions.

Part II of the paper gave some quantitative data derived for the effects of carbon, manganese, silicon and phosphorus on the hardenability of a steel. Effects of aluminum additions on hardenability, through the effect on grain size, were also measured. The hardenability effects, independent of the quenching effect, were also interpreted.

In the appendix the mathematical methods were described for deriving the cooling times and cooling rates involved in the primary charts.

At the same session, G. T. Williams, of Cleveland Tractor Co., in his paper "Transverse Hardness Tests of Heat Treated Steels," gave a series of transverse hardness curves for carbon, chromium-nickel, and chromium-molybdenum steels quenched and drawn at several temperatures. The effect of time-quenching and of section size in tempering were each shown on one steel.

Age-hardening effects have been found in the steels tested, when a mild quench was followed by reheating between 350 and 900 deg. F. It was found that carburizing had a damaging effect on core hardness, noncarburized steels hardening to higher core values.

The "Hardenability of Low Chromium Steels" was next treated by W. Darfts and J. L. Lamont, of Union Carbide and Carbon Corp. Engineering steels containing up to 3 per cent chromium were normalized, oil-quenched, and water-quenched to determine their predominant hardening characteristics and the relations existing between mechanical properties and microstructure. Normalized chromium steels were found to have controllable tensile strength and high ductility when the microstructure was wholly pearlitic or wholly pseudo-martensitic. Suitable ranges of composition and the properties of the more useful types of normalized steel were then outlined. The effect of chromium in counteracting the effect of mass in quenched bars was investigated in sections up to 2 in. in diameter, and the hardness was correlated with microstructure to permit estimation of the hardening characteristics of chromium steel was found to take place at about 1 per cent chromium.

Secondary alloys were shown to have a significant influence on the hardenability of chromium steels. The manganese content was critical in all conditions of heat treatment. In the higher chromium steels a relatively low manganese content was essential and in the low and intermediate chromium steels a relatively high manganese content increased hardenability but increased the tendency toward distortion in quenching caused by differences of advantage in increasing the strength, ductility, and resistance to distortion.

At the simultaneous session, Friday morning, G. A. Ellinger and G. S. Acken, of National Bureau of Standards, described, "A Method of Preparation of Metallographic Specimens." ards, described, "A Method of Preparation of Metallographic Specimens." been successfully used at the National Bureau of Standards for several years. Intermediate preparation of specimens is done on a grooved lead-tin (50-50) disk in which emery has been embedded. V-shaped grooves arranged in a rectangular pattern serve to hold lubricants and to catch particles of dislodged emery. Soft metals and those containing non-metallic inclusions, which are ordinarily considered difficult to prepare, have been polished

using this method. Photographs of structures of lead, tin, silver, graphite flakes in cast irons and non-metallic inclusions and other structural features in steels were shown as examples of the use of this technique.

A following paper, "Automatic Polishing of Metallurgical Specimens Using Cast Iron and Lead Laps," by T. Jarrett, American Optical Co., described a method of polishing metallurgical specimens by the use of cast iron and lead laps. Flatness, freedom from flow of metal and the retaining of inclusions are highly important factors in polishing, and the use of this method tends to accomplish these objectives. Results were given in the paper.

In the last technical session, Friday afternoon, the papers presented composed a symposium on hardenability and low alloy steels. In this group was, "Hardenability and its Designation, The Hardenability Line," by B. R. Queneau and W. H. Mayo, of Carnegie-Illinois Steel Corp. In this paper an attempt was made to clarify the exact meaning of the term hardenability. The authors defined it as that characteristic of a heat of steel which determines its capacity to harden throughout when quenched; it is a direct function of the critical cooling rate and as such is independent of external quenching conditions.

A simple relationship was found between the several depths to which different size bars of a steel harden under the same external conditions. As a result of this knowledge, a simple measurement serves to identify and designate fully the hardenability of a commercially uniform lot of steel. This index was called the "hardenability line."

Some quantitative data was given to show the usefulness of the "hardenability line" in determining difference in hardenability between heats of identical analysis, in showing the effect of alloy content, grain size and quenching temperature on hardenability, and in predicting the depth of case in a sample of any commercially hardenable size of any one of the three simple shapes (spheres, rounds and flats).

A following paper, "Hardenability in Light Sections," by G. W. Luerssen, Carpenter Steel Co., consisted of a summary of present knowledge of the factors affecting hardenability in small sections. The subject was discussed under the heads of variations in analysis, inherent properties, preliminary treatment, design and quenching media. A bibliography of the subject was attached for more detailed reference to the various topics discussed.

The final paper, "Hardenability of Plain Carbon Steels," by J. L. Burns and G. C. Riegel, Caterpillar Tractor Co., gave a definite relationship between hardenability, as expressed by the area under the hardenability curve of a 1-in. round, and chemistry and grain size. Surface hardness was shown as being dependent solely on carbon content when the critical cooling rate is attained or exceeded; the depth of hardening depends upon the chemistry of the steel and the austenite grain size at the quenching temperature. It was not believed that there are other "mysterious" factors influencing hardenability of practical significance. Chemical segregation was found to be a minor but noteworthy factor.

The various sections which can be hardened completely through in the various possible chemistry combinations were illustrated. The depth to which any section will completely harden in any chemistry and grain size also was presented.

The effect of the important separate elements (carbon and manganese) upon area under the hardenability curve was derived, and the quantitative effect on hardenability produced by changing from a fine to a coarse grain illustrated.

The relative hardenability of all of the S.A.E. plain carbon steel was shown and the spread in hardenability also shown between minimum and maximum chemistry for each grade of steel.

The application of data in practical use was discussed and specific examples shown. It was believed that the data presented make for a more correct translation of a steel user's requirements (mechanical properties) into a steel maker's terms (chemistry and grain size.)

As an indication of the type of data presented in the paper, note Fig. 3 which permits choosing the carbon content to give the hardness desirable. It would then be necessary to add sufficient alloying elements to permit the attaining of this hardness at the center of whatever section is chosen.

TWO welding operators supplied with power by Westinghouse a.-c. welding sets are fabricating the end frame of a large power transformer. Use of a.-c. welders is growing, and sizes now range from 75 to 1000 amp.

Comprehensive Program Features

WITH 13 technical sessions at which 46 papers were presented and discussed, the president's reception, the annual business meeting, the usual dinner-dance, plant inspection trips, and visits to the National Metal Exposition, which included a large number of welding equipment and supply displays, the 19th annual meeting of the American Welding Society, held at the Book-Cadillac Hotel, Oct. 16-21, offered something in the way of a record program. Registration at the meeting was in excess of 900.

New officers were elected and two medals awarded, as recorded elsewhere in this issue.

Technical sessions opened auspiciously, with an attendance estimated at 350. The first session, devoted to welding in construction work, followed a gracious address of welcome by the Hon. Richard W. Reading, Mayor of the City of Detroit.

Single-Pass Electric Welding Application Described

Application of the single-pass or Unionmelt process was described by R. M. Wallace, assistant superintendent, Griscom-Russell Co., Massillon, Ohio, in a paper on "Single-Pass Electric Welding of Unfired Pressure Vessels." The process has been used at the Massillon plant for more than a year, producing pressure vessels for all types of service, most of them subject to inspection by Code rules.

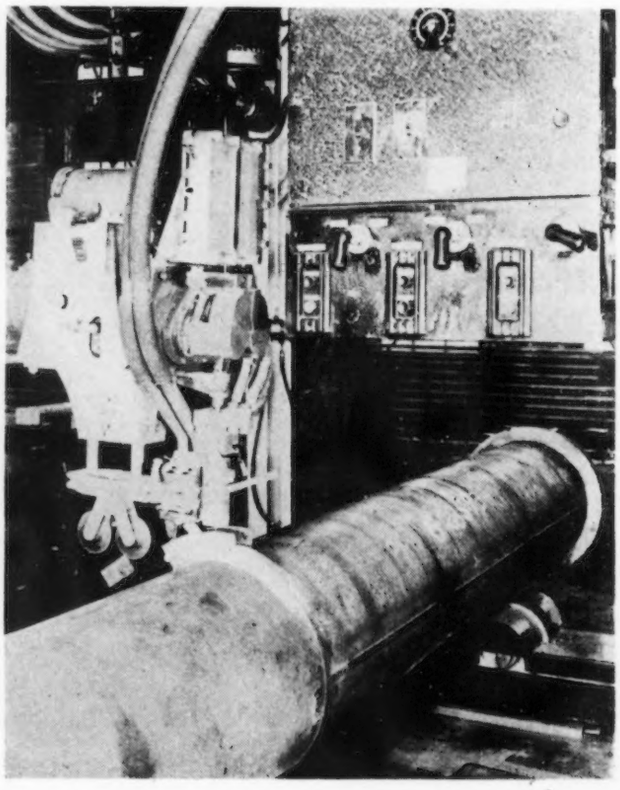
This new welding process, developed by the Linde Air Products Co., has been employed with noteworthy success in shipbuilding as well as in the manufacture of boilers and tanks. It consists of melting bare steel rod into the open space between the plates to be welded. The gap between the plates is filled with a powdered mineral which acts as flux and also as a source of heat derived from the electric current that is made to flow from rod to the plates through the powder. The gap is backed up by a copper strip that prevents the powder and molten metal from draining away through the gap.

The human element is almost entirely eliminated. The rod is held vertically above the gap between the plates; as it melts, some of the flux also melts and protects the molten metal so that the weld contains practically no nitrogen. The rod is moved along the plates through the flux and completes the weld in a single pass.

In butt welding mild steel plates 1⅛ in. thick by the Unionmelt process, the bare rod is 5/16-in. diameter and moves at a speed of 9⅜ in. per min., the current and voltage being 1320 amp. and 39 volts, respectively.

The process has been most successful in welding boilers 14 in. to 7 ft. diameter, ¼ to 1½ in. thick. The welds are said to have essentially the same composition, strength, and ductility as unwelded base metal, even in stainless 18-8 steel and in steel containing 4 to 6 per cent chromium. The latter steel is preheated for welding. If mild steel is to be welded by the process it should preferably be of slightly higher quality with respect to slag and sulphide inclusions than ordinary boiler plate.

At the same session A. N. Kugler, engineer, Air Reduction Sales Co., spoke on "Structural Welding In New York City," illustrating his address with lantern slides and colored motion pictures. In the short space of nine months, or since the city's new building code became effective, 4135 tons of structural steel has been welded.



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CLOSE-UP view of Unionmelt welding head and the control apparatus for its operation. This picture was taken while a circumferential joint of a vessel 19 in. O.D. by ½-in. plate thickness was being welded.

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Welding Meeting . . .

One of the buildings, a 14-story apartment house, involved about 720 tons of steel. The connecting materials amounted to 31¾ tons, and the welding totaled 11,870 ft. of all sizes, 69 per cent of which was shop welding and 31 per cent field welding. Requirements of the New York building code were outlined, and interesting details of the various welded structures described. A welding cost analysis of the first all-welded building, the 14-story apartment house, was also given.

Production Welding of Small Machine Parts

Production welding of small machine parts was the topic of an entire session. Demand for automatic features has resulted in a great number of subassemblies in each machine and they are more complex, said E. J. De Witt, vice-president, Wallace Supplies Mfg. Co., Chicago, in an address on "Welding of Small Subassemblies in a Program of All-Welded Machines." As these units become increasingly difficult for the pattern maker and foundryman they provide a greater range for the welding designer; the field of the latter is broadened if pattern and foundry expense is high. As an example, he gave details, including cost comparisons, of the bending arm of an old type bender and the same part for an automatic bender.

The problem of design for welding is interesting, he said, because of the great flexibility and freedom which a designer enjoys. By breaking down a machine into its component parts, the designer will have, instead of a complex mechanism, a number of comparatively simple units which can be analyzed to a large extent independently of the rest of the machine. He will find as he delves into the art, that practically anything can be built of welded steel, said Mr. De Witt.

Precision Assembly by Resistance Welding

Production by resistance welding of the many precision assemblies required in business machines was described in an outstanding paper by F. D. Rogers, welding engineer, International Business Machines Corp., Endicott, N. Y. The parts range from those the size of a pin head to some weighing 350 lb. An example of the smaller parts is the full wire unit, which consists of a length of piano wire with terminals resistance butt welded to the ends.

The resistance welding process consists in passing a heavy electric current through two parts clamped together. The current brings the parts at the point of contact to the fusion point; the metal of the two parts flows together and the weld is made. In some cases a projection or ring is formed on the part to be welded, to localize the heat. The process is embodied in resistance welding machines that are fully automatic, the control being largely hydraulic. With these welders the units of business machines are being regularly produced to an accuracy of 0.001 to 0.002 in. It was said that none of these welded parts have failed in service, and that factory rejections traceable to welding are less than 0.4 per cent.

The influence of shop preparation of materials, and of proper tools, jigs and fixtures on arc welding costs, productive output, and workmanship was emphasized by M. S. Evans, plant engineer, American Car & Foundry Co., Berwick, Pa., in an address at the

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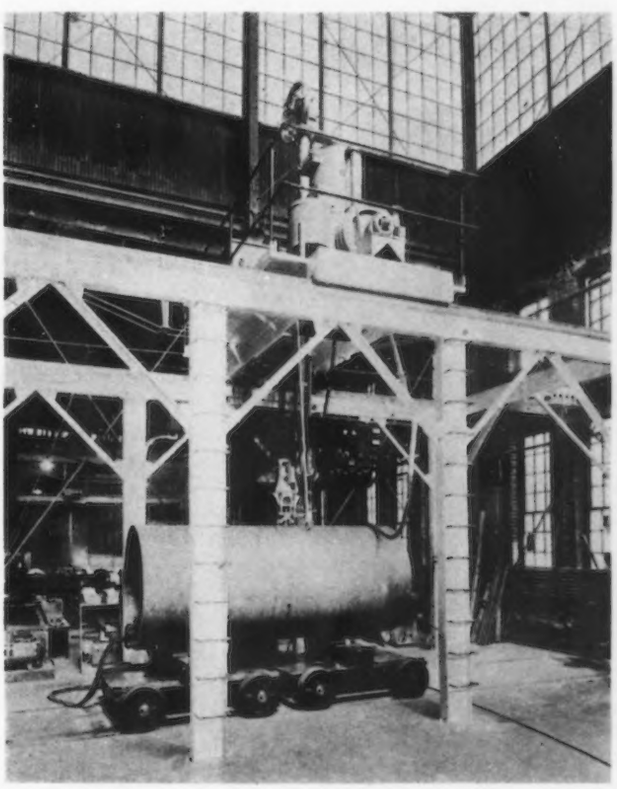

UNIONMELT automatic electric welding set-up at the Massillon, Ohio, plant of the Griscom-Russell Co. and described in a paper by R. M. Wallace at the A.W.S. meeting in Detroit last week. In this view the automatic welding head is positioned for welding a longitudinal seam.

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same session. Jigs and fixtures should be constructed to allow the welder ample room to manipulate his electrode, yet the construction must be sufficiently rigid to withstand distortions created by the heat of welding. The necessity for providing the welder with accurately cut material for welded assembly is even more pressing, as a poor fit wastes both time and welding rods.

In "Welding As Applied to the Fabrication of Industrial Stokers," F. R. Mason, Riley Stoker Corp., Detroit, described the welding of stokers of various types and of Atritas pulverizers, air ducts and breechings and tanks for flue gas scrubbers. New applications are constantly being found as designs change to meet new conditions and developments in the fuel-burning field.

Joint Session With A.S.M.E.

A joint session with the American Society of Mechanical Engineers comprised four interesting papers, two of which were devoted to welded piping. One of the latter was on "Welded Joints In Carbon-Molybdenum Piping," by R. W. Clark, works laboratory, General Electric Co., Schenectady.

The comparatively recent increase of steam temperatures and pressures in modern power stations has placed much more rigid requirements on joints in piping for this service. The material favored by the author for steam power piping is a low-carbon steel containing ½ per cent molybdenum. Sound welds, without blowholes, have been accomplished by use of covered arc electrodes containing ½ per cent molybdenum, ⅛ or 5/32 in. in diameter, together with any of four well-known grooves. Cracks have been avoided by preheating. The pipe is heated to 500 deg. F. in the vicinity of the welding grooves by means of ring gas burners. For further safety under severe conditions the weld may be relieved of shrinkage stresses by being reheated locally to 1200 deg. F.

H. D. Lanterman, Carbide & Chemical Corp., described an interesting shop set-up and some of the procedure in welding bronze and other non-ferrous piping.

Weld-Fabricated Refrigeration Machinery

In an address on "What Welding Has Done for the Refrigerating Industry," E. A. Behling, superintendent, Vilter Mfg. Co., Milwaukee, showed some 15 extensive applications of welding which, with the Vilter company dates back to 1906, when a Thomson butt welder was used in the manufacture of ice tank coils. Arc welding is used in the manufacture of shell-and-tube condensers and brine coolers, except for the mechanical rolling-in of the tubes. The shells are 16 to 60 in. in diameter, ⅜ to 1 in. thick, and the tube sheets at each end are 1½ in. thick. An oxy-acetylene

JOSEPH W. MEADOWCROFT, assistant works manager, Edward G. Budd Mfg. Co., recipient of this year's Samuel Wylie Miller Memorial Award, as reported on page 28 of this issue.

cutting machine is employed for beveling the plates and for cutting tube sheets and pipe flanges. Equipment for making ice briquets and a shelf coil-unit made up of rectangular tubing were among several interesting welded products described and illustrated.

The silver alloy brazing of tubes in high-pressure boilers was described by A. W. Weir, New York Central Railroad, in a paper prepared jointly by Mr. Weir and H. M. Webber, General Electric Co., Schenectady. The boilers are of vertical fire-tube type use on passenger-electric locomotives to furnish steam heat and hot water. The tubes are of copper and the heads are of ¾-in. steel.

"Quality and Efficiency in Oxygen Cutting," by G. M. Deming, engineer, apparatus research and development department, Air Reduction Sales Co.; "Bi-Metal Construction of High Temperature Steel Valves," by E. R. Seabloom, Crane Co.; and "Bronze Welding," by W. S. Walker, Linde Air Products Co., were papers at a session devoted to welding and cutting processes.

In addition to comprehensively discussing the operation of cutting machines, including economic considerations, Mr. Deming gave a number of pointers on the purchase and care of such equipment. The purchaser should make certain that the diameter of the smallest restriction in the cutting oxygen passages of a torch is at least 20 per cent larger than the cutting orifice of the largest tip to be used, he said. He should also be aware that there are three-hose torches possessing many conveniences of adjustment over the more customary two-hose torches. Details of cleaning the tip and maintaining the torch and machine at maximum efficiency were also given.

Large Machine Tool Structures Welded

That machine tool builders have thoroughly investigated the possibilities of weld fabrication of their products was strikingly evident from a paper on "Recent Developments in the Welding of Machine Tools," by L. F. Nenninger, chief engineer, and W. A. Maddox, supervisor of welding, Cincinnati Milling Machine & Cincinnati Grinders, Inc.

At first some mistakes were made, as in every other field of application, but now machine performance problems directly attributable to welding are quite rare, it was stated.

In speaking of early experiences, the authors said: "When we stop and look at our present developments in welded machine tool structures and consider the weaknesses and errors of our first attempts, we realize that the error was not in our theories, nor was it due to the material we used. The difficulty was primarily where we put this material, how we joined it to adjacent pieces, and what steps we took to relieve the stresses after fabrication.

"When we first started to substitute steel for cast iron we overlooked the basic fact that castings contained many ribs, generous fillets and the most vital condition, that is, one section blends into another in such a manner that all the surfaces, walls and ribs work together as one mass."

The designing engineer in fabricating a machine tool of steel has the problem of getting all the essential properties into the steel structure that

are inherent in a good casting, it was said.

Topics covered in this very interesting paper included reasons determining the use of cast iron or steel; the problem of special structures; and design advantages. Several machine tools incorporating welded steel construction were shown by lantern slides, including large centerless grinders, Hydromatic and Hydrotel milling machines and the company's Hydro-Broach machines. In concluding the authors said:

"When we take the long range view of the question of welding as applied to machine tools, we realize that there will be opportunities to build machines which will be reasonable in cost and at the same time match the performance of equipment built with cast iron. Therefore, the use of welding in future constructions depends largely upon mechanical suitability of the material for a particular application and its ability to equal or get below the cost of cast iron designs."

In a paper on "Machine Flame Cutting with Small Machines," Otto C. Voss, Allis-Chalmers Mfg. Co., pointed out that oxy-acetylene cutting is today a highly developed art but that it is important that the purchaser select the machine which is best adapted for his work.

To produce the multiplicity of flame-cut shapes that are in common use, Mr. Voss employs one of a number of types of machines consisting of a carriage to carry the torch and a track of desired contour. The machine traverses the track and cuts the steel, which may be ⅛ to 14 in. thick, to shape anything from a simple lever to a locomotive frame.

Two technicians are involved: the layout man and the cutting machine operator. The former is the real key to the problem of producing cut shapes that can be assembled without additional machining. He must produce templates from blueprints and must be thoroughly acquainted with welding technique and shrinkage.

Opportunities for the welding industry in the welding of oil well casing were outlined at the same session by Mike Murphy, Air Reduction Sales Co., Dallas, Texas. Mr. Murphy also reviewed what has been done in that field.

Satisfactory welding methods using either oxy-acetylene or arc welding with covered electrodes have been developed. The methods are almost identical with ordinary pipe welding, which has been standard practice for several years. The pipes are vertical when the welding is done. Difficulties created by the high strength of casing steel have been overcome. The most popular type of joint is the bell-and-spigot, although other types are equally satisfactory. Two or three welders work simultaneously on each joint so that the casing is strung with unusual speed.

The entire day of Oct. 20 was devoted to sessions on automotive welding. A brief report of these and of the shipbuilding and railroad sessions, held simultaneously on the morning of Oct. 21, will be given in the next issue.

Simultaneous with some of the above mentioned sessions were four others, with a total of 16 papers, devoted to industrial and fundamental welding research, a prominent activity of the society. Several of the papers at these sessions were of outstanding importance.

Inspection trips, reserved for the last day of the meeting, included visits to the Great Lakes Steel Corp., Ford Motor Co., Plymouth Motor Co., and the Packard Motor Car Co.

Remote Control Facilitates Welding Large Water Pipe-Line

TO facilitate field welding of the nearly 3,000 sections of 51 and 55-in. diameter, 30-ft. long steel pipe for the 17-mile first section of the pipe-line here illustrated, remotely controlled arc welding sets are being employed. This first section of the Metropolitan Water District's Palos Verde feeder will eventually deliver water to cities of the Los Angeles Harbor area. In permitting adjustment of the welding voltage at the work, the remote control on each of the 15 General Electric 300-amp., gasoline-engine driven arc welding generators makes it unnecessary for the operators to climb out of the trench when voltage change is required by change in welding position. Obviously, this saves a great deal of time, and is especially important when the trench is deep or when the operator is working inside the pipe at a

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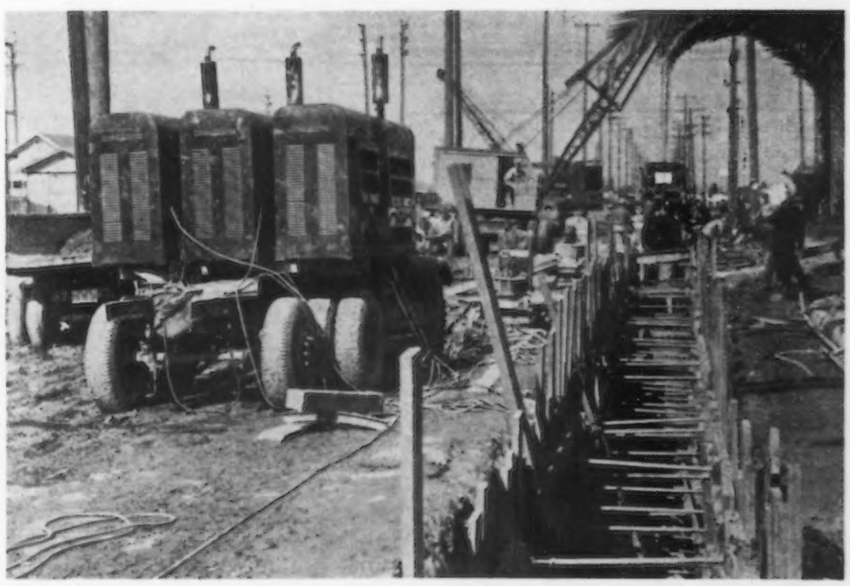

ARC welding sets employed in welding the 30-ft. lengths of steel pipe in this Eagle Rock-Palos Verde water line are equipped with remote control so that the welders do not have to climb out of the trench when voltage change is required.

Theoretical Research Features A.I.M.E. Program

WITH a registration totaling well over 500, the American Institute of Mining and Metallurgical Engineers presented some 28 papers at last week's Metal Congress. Attendance at both the Iron and Steel and the Institute of Metals Divisions at the Book-Cadillac Hotel was the best in recent history of the A.I.M.E.

Most of the technical manuscripts dealt with recent highly important research in ferrous and non-ferrous metallurgy, but lack of space herein precludes a detailed report of the wide range of subjects covered. In selecting a few of the papers at random, mention should be made of several subjects covered in the session on physical chemistry of steel making, the first morning session of the Iron and Steel Division. One paper in this group described interesting experiments on the reduction of iron ores under pressure, the investigation in this instance being conducted by M. Tenenbaum and C. L. Joseph, of the University of Minnesota. In laboratory tests, using hydrogen pressures up to two atmospheres, it was found that the reduction time was cut almost in half and the fuel consumption reduced materially. Considerable discussion ensued regarding future possible adoption of a practice of this type, as steel makers are forced to fall back on low grade iron ore reserves.

A simultaneous meeting of the Institute of Metals Division featured three papers dealing with diffusion and recrystallization in copper and brass. One paper, "Development of Abnormally Large Grain Sizes in Rolled and Annealed Copper," was prepared by M. Cook and C. Macquarie, of I.C.I. Metals Ltd.

These two experimenters pointed out that abnormally large crystal sizes can be developed in rolled copper strip or sheet provided the final cold rolling reduction exceeds about 95 per cent and the final annealing temperature is of the order of 1000 deg. C. Similarly, large crystal structures can be produced under the same conditions of final annealing, with a final cold rolling of not less than about 85 per cent, provided the temperature of the penultimate annealing does not exceed 550 deg. C. and that the total cold rolling exceeds 96 per cent. The structure after these heavy reductions is similar whether the final rolling is the same or normal to the direction of previous rolling.

If the final rolling is limited to 30 to 70 per cent reduction, and is effected normal to the direction of previous rolling, the largest crystal size is obtained by annealing finally at about 800 deg. to 850 deg. C. The crystals, according to Cook and Macquarie, are smaller than those obtained with heavier final rolling reductions followed by annealing at 1000 deg. C., and differ from them in being much more equiaxed and free from circular markings and structures. For the production of these crystals by finally cross-rolling with a reduction of about 50 per cent an annealing at 800 deg. to 850 deg. C., the penultimate rolling reduction of about 90 per cent appears to be necessary, and the optimum annealing temperature prior to the final cross rolling is about 450 deg. C.

These results were obtained with two brands of H. C. copper, but with a phosphorus-deoxidized copper of comparable purity, except for the residual phosphorus, and less pure copper such as tough-pitch and deoxidized arsenical, large crystals were not produced by either sequence of operations.

THE Monday afternoon session of the Iron and Steel Division was particularly important, dealing as it did with the timely subject of rimming action. Two papers, representing work done in Sweden and in the United States, were found to supplement each other, the final conclusions drawn being sustained by both groups of investigators in most instances. In the American paper, "Mechanism of Solidification and Segregation in a Low Carbon Rimming Steel Ingot," it was pointed out by the authors, Anson Hayes and John Chipman, of Armco and M.I.T., respectively, that the primary cause of segregation is distribution of impurities between solid and liquid iron. A second major factor is the formation of an enriched film in the liquid adjacent to the solidifying interface and the entrapment of parts of this film in the growing crystals. This entrapment is in turn greatly affected by rate of solidification and rate of stirring, the latter being almost entirely dependent upon gas evolution. A further contributing factor is the loss of carbon and oxygen by gas evolution, and of the latter also by precipitation of non-metallics.

A mathematical treatment was presented which applies to a simplified hypothetical type of segregation in which equilibrium exists between solid and liquid phases and the enriched film is completely mixed, with the bulk of the solution. Such a process would yield the maximum segregation.

In their development of the theory of segregation, the authors made a careful estimate of the composition of the liquid metal during solidification. It was shown that a vertical concentration gradient builds up during the rimming period, giving rise to longitudinal segregation. The cause lies in the elevation of part of the enriched film by upward currents near the solid interface.

The entrapment of a fraction of the excess impurities in the enriched film was studied mathematically and the fraction entrapped was calculated from the simultaneous compositions of solid and liquid metal. Sulphur and copper show essentially the same entrapment while a much smaller fraction of carbon and oxygen is entrapped.

The entrapment figures for sulphur are considered more dependable by the

authors than those of the other elements. Assuming that the fractions entrapped are the same for manganese and copper as for sulphur, it is now possible to compute the segregation curves for these elements in the middle of the ingot. The calculated curves presented were in good agreement with the analytical data.

Similar methods were applied to the entrapment of carbon and oxygen on the basis of the simple assumptions that a part of the enriched film is evolved as gas and that the fraction of the remainder which is entrapped in the solid is the same as for the non-volatile elements. On this basis the fraction of the film which is evolved as gas is computed, as well as the total weight of carbon and oxygen evolved from the film. It was found that the film loses about three-tenths of its carbon content and more than half of its oxygen.

The total carbon and oxygen losses are known from the rate of gas evolution. It was found that the greater part of the carbon and less than half of the oxygen evolved have their origin in the enriched film itself, the remainder coming from the adjacent liquid.

THE Tuesday morning session of the Iron and Steel Division concerned itself primarily with the mechanical properties and metallography of iron. One paper, "Effect of Phosphorus on the Properties of Iron," was presented by Dr. Heihachi Kamura, of the Meji College of Technology, Japan.

Dr. Kamura's investigations showed that the effect of phosphorus on mechanical properties of otherwise relatively pure iron was in many regards similar to the effect of carbon in iron. The tensile strength and the elastic limit were increased by phosphorus; their respective maximum values being 71,000 and 50,000 lb. per sq. in. at 0.65 and 0.70 per cent phosphorus. Further alloying with phosphorus decreased the strength of alloys and made them so brittle they fractured in tension without measurable plastic deformation. The elongation and reduction of area values decreased with phosphorus and became vanishingly small at 0.8 per cent phosphorus.

The resistance to impact increased with phosphorus up to 0.60 per cent. Above this amount the impact resistance decreased rapidly. Alloys with more than 0.4 per cent phosphorus showed no worth while impact resistance. The Brinell hardness of the annealed iron-phosphorus alloys increased at a slowly diminishing rate as the phosphorus content increased.

In the same session, R. H. Thielemann, and E. R. Parker, of General Electric Co., presented some interesting results of experiments dealing with the fracture of steels at elevated temperatures. The studies were conducted at temperatures ranging from 1000 deg. to 1200 deg. F., and at these temperatures various steels were tested in tension to determine the effect of time prior to rupture, and, also, the effect of temperature on the type of fracture. Materials also were tested in hydrogen to examine the effect of the elimination of air.

The authors found that certain steels are just inherently brittle at elevated temperatures, and that oxidation is purely a secondary factor accelerating the final fracture but not the primary cause of it. Typical of steels failing at high temperature with very little elongation was such a composition as 0.10 C and 0.5 Mo, whereas it was found that a steel such as 5 Cr, 0.5 Mo., 1.5 Si and 0.10 C would ultimately fracture at high temperature with considerable ductility. Such a steel would give warning and would be far safer to use for such structures as high temperature boilers and oil cracking stills.

A highly interesting manuscript, entitled "Structure of Iron After Compression," by C. S. Barrett, of Carnegie Institute of Technology, was presented at this same session.

Mr. Barrett described his method of compressing specimens by rolling them successively in many different directions thereby permitting deformation up to the limit set by the capacity of the material to flow without fracture. This and more conventional means of compression were applied to alpha iron, and the results were analyzed by a special optical method, as well as by standard X-ray methods.

Single crystals or individual grains of alpha iron do not, in general, seek a single orientation during deformation by compression. A crystal initially having [100] near the compression axis, according to Mr. Barrett, will end as a distorted crystal with [100] parallel to the axis, while one starting with [111] near the axis will end as a distorted crystal with [111] parallel to the axis; all others cease to be single crystals and produce the structure known in literature as deformation bands, etch bands, or X-bands. The crystalline material in the bands rotates progressively as deformation continues, in a direct manner so as to bring [111] in one band and [100] in another band into position parallel to the axis. The fraction of a crystal possessing each orientation depends upon the initial orientation. This mechanism is responsible for the compression texture of polycrystalline iron which Mr. Barrett redetermined and found to be a double fiber texture with [111] and [100] parallel to the compression axis. The orientations were illustrated with models.

It was concluded that slip occurs on a considerable number of slip systems to produce these effects; a graphic representation of all possible slip systems and their resolved shear stresses was presented. According to the author, deformation bands have probably introduced errors in the slip-plane determinations of Taylor and Elam on alpha iron and beta brass and may possibly have been mistaken for local distortion at slip planes by several experimenters. Deformation bands analogous to those in iron apparently form in other metals. both face-centered and body-centered, and it was suggested that in such cases deformation bands are important factors in the development of deformation textures and recrystallization textures.

A simultaneous session of the Institute of Metal, Tuesday afternoon, featured three papers on aluminum alloys and age hardening. M. Cohen, of M. I. T., described "Age Hardening of Duralumin," wherein it was pointed out that the basic aging mechanism of duralumin involves a pre-precipitation stage as well as actual precipitation. Mr. Cohen believes that the pre-precipitation stage is a process of nucleus formation in preparation for the precipitation of $CuAl_2$. However. when the precipitation occurs, it does not take place uniformly. Localized precipitation sets in first along the grain boundaries, and this is ultimately followed by general precipitation within the grains. The pre-precipitation stage is indicated by slight contraction and a considerable increase in electrical resistance, but no change in microstructure or lattice parameter. The localized pre-precipitation stage is characterized by a slight expansion, a modest decrease in resistance and a darkening of the grain boundaries, according to Mr. Cohen, but still no change in lattice parameter. The general precipitation stage is accompanied by a large expansion, a rapid decrease in resistance, a darkening of the whole microstructure and a change in lattice parameter. These three stages may overlap to a considerable degree, but they proceed at different rates and are

(CONTINUED ON PAGE 91)

Broad Economic Prob of Machine Tool

HOWARD W. DUNBAR
RETIRING officer of the N.M.-T.B.A. who presented the President's address.

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FOLLOWING a brief résumé of the effect of a rearmament program on the machine tool industry (THE IRON AGE, p. 82, Oct. 20), Howard W. Dunbar, retiring president of the National Machine Tool Builders' Association went on to discuss the domestic picture as it was affected by current political and social trends. His speech opened the 37th annual convention, held at Hot Springs, Va., Oct. 17 to 19. Tracing the growth of manufacturing industry in the United States in the past 150 years, he posed the question as to whether all our present ills are a normal cause of an ordinary depression from which we shall soon emerge to new heights, or whether they are the symptoms of a long range leveling out of production requirements in line with the leveling of the population curve and the loss of foreign markets. Must we bend only enough effort from this time forward to hold the present level of production and employment, without hope of further advancement? Mr. Dunbar thought not.

But he saw four fundamental problems that first must be met at this time:

1—A better understanding of the human relations side of business, which until now has in a large degree been overshadowed by problems of manufacture and distribution.

2—An improvement in manufacturing facilities so that the handicaps now imposed on business may be met and the spread between cost and selling price still provide a reasonable profit.

3—The industry must lift itself out of the "order-taking class" and develop a greater sales consciousness and a better sales technique.

4—Ingenuity must devise new ways to greater refinement in all manufacturing processes.

Only by a continued search for lowered manufacturing costs and the reduction of waste will real wages go up and a higher standard of living be achieved, continued Mr. Dunbar. But as soon as further increase of output per worker is mentioned, the cry of technological unemployment arises. Those instances where the immediate result of the installation of better equipment is the displacement of workers must be constructively dealt with by the adoption of sound industrial policies or by governmental cooperation when that is necessary.

Market Possibilities

As to market possibilities for machine tools in the future, Mr. Dunbar pointed to seven straws in the wind:

1—Untold numbers of obsolete machines must be replaced.

2—War scares will lead all nations, including our own, to prepare—and in preparedness lies the greatest security for peace.

3—Decentralization of large industries, brought on by restrictive legislation, will increase demand for new tools.

4—Struggle for refinement in mechanical dimension and surface quality will create new and better machines.

5—Labor legislation and restriction will stop expansion and bring about a demand for more productive machinery.

6—Depleted inventories must be replaced with the first sign of improvement.

7—Lastly, the possibility of the development of new products must not be overlooked.

For some seven years, he noted our manufacturing corporations have spent less than their depreciation reserves for repair and replacement of facilities. Power companies have not expanded their capacity in proportion to the widening market for power, and even a partial recovery may bring a power shortage to many industrial communities. The need for generating facilities will be reflected in a demand for machine tools, Mr. Dunbar said. He also foresaw needed reconstruction of the whole railway structure and with it a large demand for machine tools. The programs of the Navy and the Maritime Commission are so large that existing shipyards cannot produce the volume in any reasonable period of time. To complete the program, Mr. Dunbar said more ways are needed and more equipment to fabricate parts. To him the domestic market was far from hopeless as to the future.

Reviewing recent conditions in the machine tool industry, Tell Berna, general manager of the association, noted that the decline in activity from the peak load of April, 1937, to the depths of May, 1938, was the most

lems the Chief Concern

Builders at Hot Springs

WENDELL E. WHIPP

NEWLY installed president of the National Machine Tool Builders' Association.

sudden American business has ever known, although it did not go as far as the depression of 1932. As consumer buying hesitated, producer goods' orders fell off promptly.

Foreign Business Helped

Fortunately a large backlog of unfilled orders helped many plants to keep their best men employed, and a substantial volume of foreign business was placed by Great Britain, Russia and Japan—to name them in the order of the volume of business placed. Current indications are that during the next six months the industry will again have a substantial volume of foreign orders, and that the relative volume from these countries will remain unchanged. Some machine tool builders are uneasy regarding the large percentage of foreign business, because they are anxious to see domestic business recover. Domestic orders for machine tools have been increasing slowly since May (they are now back to the level of December, 1937) but are still far below the normal capacity of the industry.

One new development in the foreign field, Mr. Berna reported, is the prospect of orders from the German government. They are said to be looking for new avenues of employment to absorb the workers who have been busy on munitions of war. The government has decided to manufacture the *Volkswagen,* an automobile in the low price class, and will look to America for the special machinery to produce it.

Foreign orders are always more difficult to handle than domestic orders, but the difficulties attendant on Russian business have reached a new high. The pressure for lower prices has been increased. Renewed attention has been drawn to six stipulations which for some years have been printed on the back of Amtorg orders. They include a 12-month guarantee, and a guaranteed delivery clause.

The Russian inspection system has caused a tremendous amount of trouble and expense. Inspectors are sometimes not available when called for, they often lack experience, they are frequently suspicious and exacting. Demands for things that were not mentioned in the original inquiry, nor in the quotation, nor in the contract, are suddenly insisted upon. Exacting, and in some cases, ridiculous tests are demanded.

Regarding the domestic market, Mr. Berna said that there has been a very definite change in the attitude of the Army and Navy toward the machine tool industry in the past year. A much more effective program of machine tool replacement is definitely under way, and Government buying will be a larger factor during the Government's next fiscal year beginning July 1, 1939.

Effects of New Legislation

While the Walsh-Healey Act affects only those who secure Government contracts, it establishes for them the 40-hr. week and a minimum wage. The Machinery and Allied Products Institute is engaged in discussing with the administrator of this act the proper minimum for the machinery industry. For all manufacturers, the Fair Labor Standards Act prescribes a work week of 44 hr. for the first year, with overtime at time and a half, and a minimum wage between 25c. and 40c. per hr. No minimum wage has been set for the machine tool industry under this law. It is likely that Mr. Andrews, the administrator, will be guided by determinations under the Walsh-Healey Act, Mr. Berna predicted.

The Federal Trade Commission Act now has authority to prevent such practices as in its judgment may be unfair or deceptive. thus approaching very nearly the restrictive features of the NRA codes. To add to the difficulties of the situation, governmental bureaus dislike to answer hypothetical questions. They do not like to rule on what they would do under a given set of anticipated circumstances. In case of doubt, the layman must first get into trouble, before he can find out what the law is.

What Is a Dealer?

Under the Walsh-Healey Act a dealer is defined as one who buys and carries articles in stock, and sells them out of this stock. Under that definition the machine tool dealer is usually not a dealer, and there has been no clarifying ruling by the Department of Labor, charged with the administration of this act, but the Army and Navy are placing contracts with machine tool dealers. Until a mass of rulings has been accumulated, there is

serious doubt as to the validity of the regulations.

Incentives in Industry

Incentives are the great driving power behind industry, said Col. Willard M. Chevalier, vice-president of the McGraw-Hill Publishing Co. Incentives for workers must be understood and accepted by them to make them work, citing paternalism as a non-acceptable incentive. Work security, a higher standard of living, and a sense of independence are more practical incentives. Management has the incentive to make a profit, and the investor has the incentive of the security of his capital. If the worker lays down on his job, he sabotages the incentives of management and investors, and vice versa. Predatory financial manipulation, for example, negates the efforts of management and workers. The incentives of all three must be in proper balance.

Another viewpoint of balanced interests was brought out by Louis Ruthenburg, president, Servel, Inc., who in stressing the importance of industrial relations indicated that service to customers, to stockholders and to sales intermediaries is tied up with a successful industrial relations program. The interests of the several groups are closely related and cooperation is necessary, but when conditions become sufficiently intolerable one group may refuse to cooperate, as labor has done in the past year or as capital is said to be doing now. The rights of all the groups interested must be respected if we are to enjoy a balanced economy. If an advantage is obtained by one group at the expense of the other groups, such short-sightedness can result only in failure of the pressure group to attain its own objectives.

As an example, Mr. Ruthenburg said that any influence which has the effect of restricting productive capacity per unit of manpower, will restrict our ability to improve the living standard of the average man. Unfortunately it is such influences that are now being imposed on American industry by legislation and by group pressure.

Bargaining Agencies

Speaking of collective bargaining, Mr. Ruthenburg counselled workers that before selecting their bargaining agency they should have certain questions answered: Is the proposed bargaining agency a responsible organization? Is it essentially Communistic? Has the proposed agency established a record of violence and lawlessness? Are the closed shop and the check-off

TELL BERNA

GENERAL manager of the N.M.T.B.A., who delivered an enlightening report on conditions in the industry.

known to be its objectives (questions of coercion on the part of the employer and the union are involved)? Do the representatives of the proposed agency have a sympathetic understanding of the problems of the business in which the workers are engaged? Do they realize that the ultimate interests of the workers cannot be served unless the equitable rights of customers and stockholders are also served? Does the bargaining agency embrace the notion that national living standards can be improved by arbitrary increases in wages, arbitrary shortening of hours, without corresponding increases in productive efficiency? Has the proposed agency encouraged restrictions in output? Collective bargaining, concluded Mr. Ruthenburg, is consistent with our democratic ideals, but many years of education may be required before its agencies can be developed to serve effectively the interests of the working group by bringing about a higher living standard.

The Logical Liberal Defined

Earlier in his paper Mr. Ruthenburg had divided United States citizens into four classes. Two of these he designated as pretty hopeless—the tories, or die-hards, and the moochers, that vast and formidable army whose allegiance can be bought with various coin—relief payments, jobs, political preferment, appropriations, etc. No darker page has ever been written into American history than the current exploitation of those who depend for their livelihood upon doles in various form. The two remaining groups he described as liberals—logical liberals and emotional liberals. The two groups are pretty well in agreement as to objectives, and differ principally as to methods by which the objectives may be obtained. The logical liberal wants to know how we are going to get there. The emotional liberal, on the other hand, is relatively uninformed, not logical, a believer in miracles. Millions of our women voters are enlisted among the emotional liberals, with whom Mr. Ruthenburg believes the balance of power lies. The logical liberals are therefore confronted with the task of converting the fallacious beliefs of our unthinking, emotional friends to concepts of common sense consistent with proved principles and American traditions. Industrial leadership must assume new duties in this matter of general enlightment, since in all of our current controversies, public opinion functions as the court of final resort. This enlightment can best be attained by an all-embracing public and industrial relations program, which Mr. Ruthenburg then proceeded to expound as mentioned above.

Another speaker who pointed to political trends and the importance of watching current legislation was William J. Kelly, president of Machinery and Allied Products Institute, who reviewed the work of this super trade association in the past five years in presenting the viewpoint of the capital goods industries to various legislative committees in Washington. As a result of this effort, many of the most objectionable features were eliminated from bills before they were finally passed in revised form.

Predicts Sharp Upturn

Because of a rapidly accelerating rate of deficit spending upon the part of the Government, Dr. Lionel D. Edie, economist and financial adviser, predicted that business was headed toward a substantial improvement in volume between now and the middle of 1939; he maintained that such a rise was inevitable despite all the unfavorable factors of unsettled labor conditions, political fears, the increasing tax burden, rigid labor costs, and the many emotional factors involved. Conceding deficit spending to be unsound and dangerous in the long run, and practically equivalent to printing greenbacks, he estimated that as a result, the national income would rise substantially. By July, 1939, Mr. Edie forecast deficit spending of $600,000,000 a month, as compared with $50,000,000 in September, 1938.

His whole theory is predicated upon known plans for vastly increasing the tempo of public works. There was a sharp increase in planned construction in May this year, and even if only half of it materializes into actual construction, Mr. Edie calculated that Dodge construction reports for the first six months of 1939 would show a 30 to 40 per cent rise over the best six months' period in 1936-37. He made no allowance for an armament program, the tie-in of public utilities with National Defense, nor the possible expenditures by railroads when relief is granted them.

This managed currency or monetary policy (deficit spending) is bound to have an all pervasive influence. According to Mr. Edie, industrial production has to move up—as much as one-third from the low point in May, 1938. What will happen after July, 1939, he did not dare to predict. It is conceivable that private confidence may improve, the political phase may turn more conservative, private initiative may carry on when public spending cuts off, but, said the speaker, we can't count on it.

Whipp New President

At the closing session, Wendell E. Whipp, president, Monarch Machine Tool Co., was installed as the new president of the association. It was also announced that J. E. Lovely, vice-president, Jones & Lamson Machine Co., had been elected first vice-president; Fred B. Geier, president, Cincinnati Milling Machine Co., second vice-president; and Hugo L. Olson, Sundstrand Machine Tool Co., a director. T. Herberton Doan, president of the Foote-Burt Co., remains as treasurer.

Norman D. MacLeod, Abrasive Machine Tool Co., reporting for the committee on legislation, called attention to House Bill No. 9041 on trade marks, which he predicted would be amended and reintroduced by its own author. The compulsory features of the proposed bill are the chief objections, and the association adopted a resolution to the effect that it would work toward getting a better law written and enacted.

Standardization of Surface Finish

Analyzing present efforts being made toward the standardization of surface finish, Frank O. Hoagland, Pratt & Whitney Co., mentioned the Profilometer developed by Dr. Abbott and the application of this instrument by the Chrysler Corp. in measuring the effects of its new technique—Superfinish.

FRED V. GEIER

JOHN E. LOVELY, vice-president, Jones & Lamson Machine Co., was elected first vice-president, and Fred V. Geier, president, Cincinnati Milling Machine Co. (above) is second vice-president of the N.M.T.B.A.

He compared this instrument, capable of measuring surface roughness in millionths of an inch, to a voltmeter in that it recorded the root-mean-square value of the depth of scratches, and that the actual depth of scratches could be assumed to be two to three times as much as the indicated readings, a point he thought Chrysler engineers had overlooked. As to designation of surface finish, Mr. Hoagland proposed a symbol such as M^2, where M would represent thousandths and the exponent 2 the amount, in this case a maximum depth of scratches, or surface roughness of 0.002 in.

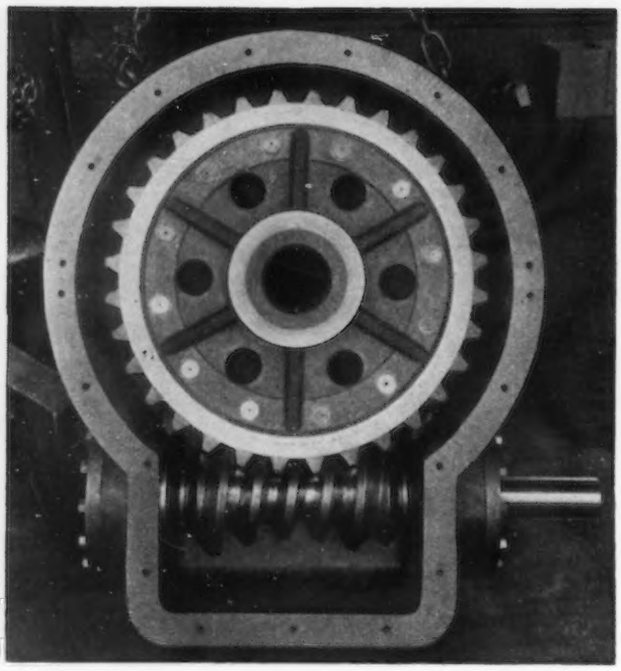
Among other observations by Mr. Hoagland was one to the effect that if the cutting edges of high speed steel tools were honed to as fine a finish as those required on cemented carbide tools for best life efficiency, improvement of 100 to 200 per cent in tool life would probably result.

Deplores Legislative Trends

The volume of legislation in the past five years has been equal to that of the previous 50 years, and most of it has originated elsewhere than in the Congress, according to Col. George T. Buckingham, counsel for the Machinery and Allied Products Institute. To him the underlying purpose of most of the bills recently introduced appears to be the bringing within the scope of Federal control practically all business activity in a manner similar to the control of public utilities and other semi-public industries like the railroads. He deplored the creation of such quasi-judicial bodies as NLRB, whose activities supersede those heretofore found in the District Courts of the United States, and whose non-legally trained examiners flout the established rules of evidence. He charged that the ultimate purpose of such bodies was to enable a bureaucratic group to obtain control over not only the persecuted manufacturer but ultimately over labor as well.

Interpreting recent statements of President Roosevelt and Thurman Arnold, Assistant Attorney General, Colonel Buckingham saw some basic and fundamental changes being made. Consent decrees under the revamped Federal Trade Commission Act are being obtained in some instances by threat of concurrent criminal as well as civil prosecution. The act itself as amended forbids unfair and deceptive acts, a vague phrase without legal precedent. The whole new setup tends to put the burden of proof on the accused. For example, similar prices in competitive bidding is now considered *prima facie* evidence of collusion in trade and hence violation of the Sherman Act. In the not too distant past, similar prices had often been interpreted as indicating stringent competition and collusion had to be proved by the Government rather than assumed. Another fundamental change affecting property rights is that the taxing power is to be made a punitive force rather than being based on spending needs and the ability of business to pay the bill. The President, for example, has advocated the use of taxing power to break up large corporate units.

We now have an Economic Planning Commission in Washington, aimed to revise the whole economic status of the country. Out of it what will come, no one can predict—a Bureau of Industrial Economics, perhaps as the President advocates. The only consolation Colonel Buckingham saw for business ahead was in the growing sense of responsibility on the part of Congressmen. The next Congress is likely to be a little more independent of the White House. How business men can best aid themselves is to head off detrimental legislation before enactment. Pressure on congressmen back home was the method advocated, as any congressman is sensitive to the feelings and convictions of his constituency and of the individuals he associates with back home.



The Cone Worm Gear in Actual Use

FIG. 1—Typical Cone worm gear with cover removed. Used on copper converter drive.

MANY unsuccessful attempts have been made in the past to produce worm gearing of the "double enveloping" type (under such names as the Hindley, the Hour-Glass, the Globoidal, and the Hollow type). When, therefore, the Cone worm gear was announced a few years ago, it was greeted with considerable skepticism, for once again the "double enveloping" type was bidding for favor.

For some years after Samuel I. Cone's invention was patented little was heard of the new gearing; the Cone Worm Gear Corporation through the Michigan Tool Company devoting its time primarily to the development of equipment suitable for the production of hobs, cutters, generating machines and checking equipment for the manufacture of the gears. None of this equipment was available at the time, owing to the fact that Cone gears only are generated on operating centers.

The problem of devising equipment to make Cone gears becomes evident from a consideration of the four basic types of worm gear drives:

Type 1—Right Angle Helical Gears. In this type of gearing, which follows the general principles of worm gearing, no enveloping action takes place, and consequently only point contact is available, with the result that this type has very limited load-carrying capacity.

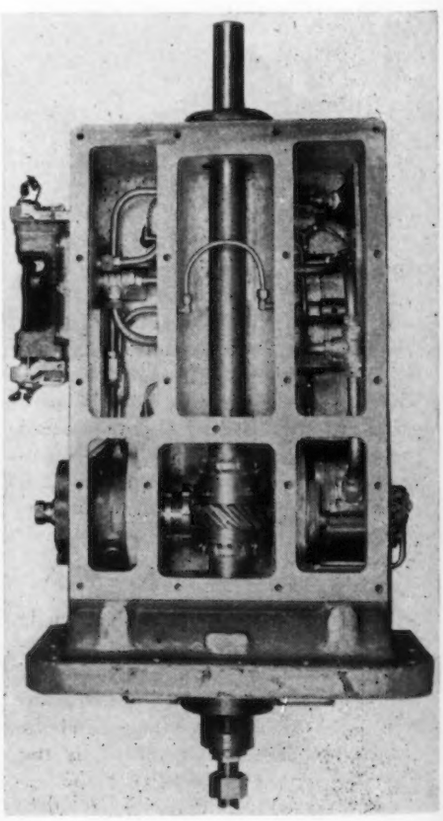
Type 2—Hour-Glass Worm and Helical Gear Combination. This type may be referred to as a single enveloping type of gearing, wherein the wheel is a master rack and is enveloped by the throated worm element. Theoretically, only line contact may be obtained.

Type 3—Conventional Worm Gearing. This type may be referred to as a single enveloping type wherein the worm is a master rack, and is enveloped by the throated gear element, but does not in turn envelop the gear. Theoretically, only line contact may be obtained.

Type 4—The Cone "Double Enveloping" Gear. The Cone type of worm gear is distinguished from those described above in that both elements are of the throated type, and each envelops the other. As a result of this type of construction there is provided, in addition to the line contact of types 2 and 3, line contact also for the full depth of the gear teeth; the two resulting in area contact.

It is evident from the above that absence of envelopment, as in type 1, results in point contact. Single envelopment, as in either type 2 or type 3, results in line contact. Only "double envelopment" as in type 4, results in multiple line contact in both directions, or area contact. To construct successful gearing employing this principle of area contact, it was necessary to develop new cutting machinery and checking equipment.

A discussion of the "Methods Employed in Making Cone Area Contact Worm Gears" appeared in THE IRON AGE of Aug. 29, 1935. That article



treated briefly the major facts of interest regarding the ideas developed by Mr. Cone (and by Michigan Tool Co. and Gould & Eberhardt Co.) for generating the proper tooth contours to permit the enveloping worm to work successfully with an enveloping gear, and described briefly the special semi-automatic machines which had then been developed for the manufacture of Cone worm gears. Since then a fully automatic type of machine of novel design has been perfected, especially adapted to cut Cone worms and gears. The fully automatic machines so far produced have a capacity up to 4 in. center distance, with wheels up to 7 in. diameter and worms up to 3 in. diameter. These sizes cover a very wide range of gearing where large quantities are desired, for the reason that a much smaller center distance is utilized with a Cone type of worm gearing than would be required with conventional types. For instance, a Cone gear of 15.619 in. center may be compared with a conventional straight worm gear of 27.000 in. center, as both are rated at the same load-carrying capacity. The usual Cone practice is to rate the Cone gear at roughly four times the mechanical, and twice the thermal capacity for conventional worm gears as indicated by American Gear Manufacturers Association ratings.

Cone Gear Applications

Today Cone gears are to be found operating in such diverse fields as are represented by the following equipment: aircraft landing gear, airplane engine governors, dam gates, excavators, gun-turret drives, indexing mechanisms, machine gun elevators, machine tools, marine steering gears, mining locomotives, mine crusher machinery, packaging machines, pipe-cutting machines, road machinery, screw-down rolls, smelting equipment, speed reducers, step-up drive units, stokers, superchargers, threading machines, truck and bus rear-end drives, turbine reduction gears, universal milling machines, winches, window regulators, cranes, charging machines, etc. Cone worm gears are now in successful use in ratios varying from 1 to 6 step-ups to 150 to 1 reductions, with speeds varying from 30,000 r.p.m. to one-fifteenth revolution per minute, and in sizes from six feet in diameter to one inch in diameter gear wheels.

The photographs reproduced herewith have been selected to illustrate typical applications of interest to readers of THE IRON AGE. From these and hundreds of other cases of record, it cannot be denied that the Cone gear has been found practicable for many types of uses.

Fig. 1 is a typical Cone worm gear drive with cover plate removed. A considerable number of these gears have been in use for several years in driving copper converters and agitators in the mining field.

Fig. 2 shows the application of Cone gearing in the hydraulic units manufactured by the W. F. & John Barnes Co. According to this company, the use of this gearing has enabled it to mount and drive the rapid traverse pump and the feed pump in a very simple and compact manner, thereby holding these high capacity units to practical dimensions and sizes. The use of Cone gearing here permitted the securing of proper speed reduction in a smaller space than otherwise, while eliminating unnecessary parts. A number of these units in use on a typical Barnes machine are shown in Fig. 3.

Fig. 4 shows a 4-high non-ferrous mill on which Cone gears are being used for the screwdown. This unit is a product of United Engineering & Foundry Corp. Longer life and high load capacity are cited as the primary reasons for the use of Cone gears in this connection.

Fig. 5 shows large Cone gears being produced on a Gould & Eberhardt gear generator at the Washington Navy Yard under license from the Cone Worm Gear Corp. Similar equipment is also being used at Rock Island Arsenal, Dominion Engineering Co. in Canada, and Michigan Tool Company among the various Cone licensees.

In the machine tool field Cone gearing has found a ready application due to its high capacity, long life, and efficiency. Fig. 6 shows a Giddings and Lewis boring mill, on which Cone gears are used for the high-speed spin-

AT LEFT

FIG. 2—Application of Cone gearing to hydraulic drive units made by W. F. & John Barnes Co.

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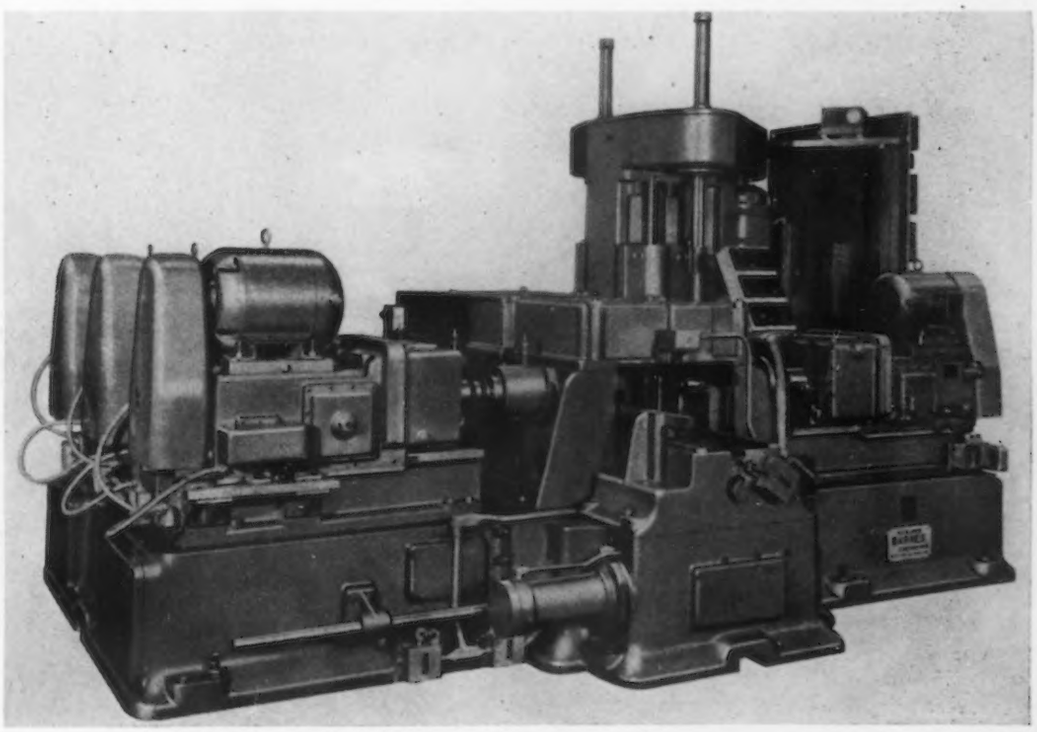
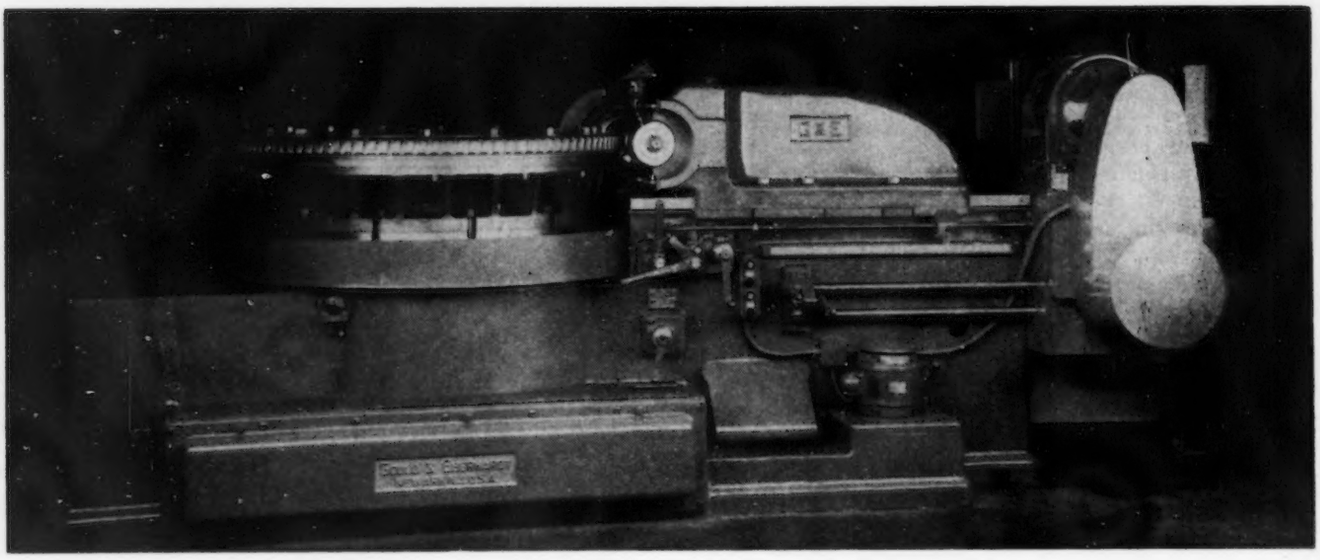
AT RIGHT

FIG. 3—Units as shown in Fig. 2 in use on a typical Barnes machine tool.





ABOVE

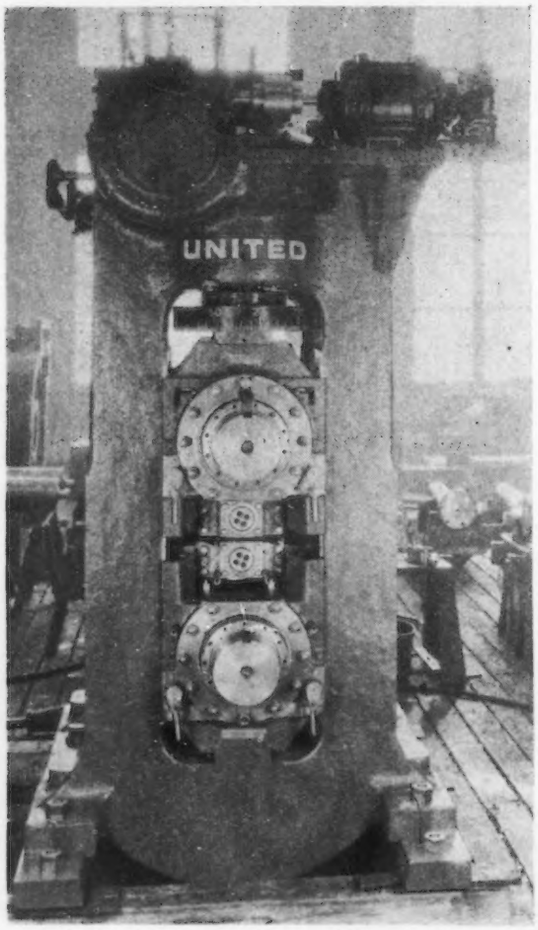
FIG. 5—Large Cone gears being produced on a Gould & Eberhardt gear generator at Washington Navy Yard.

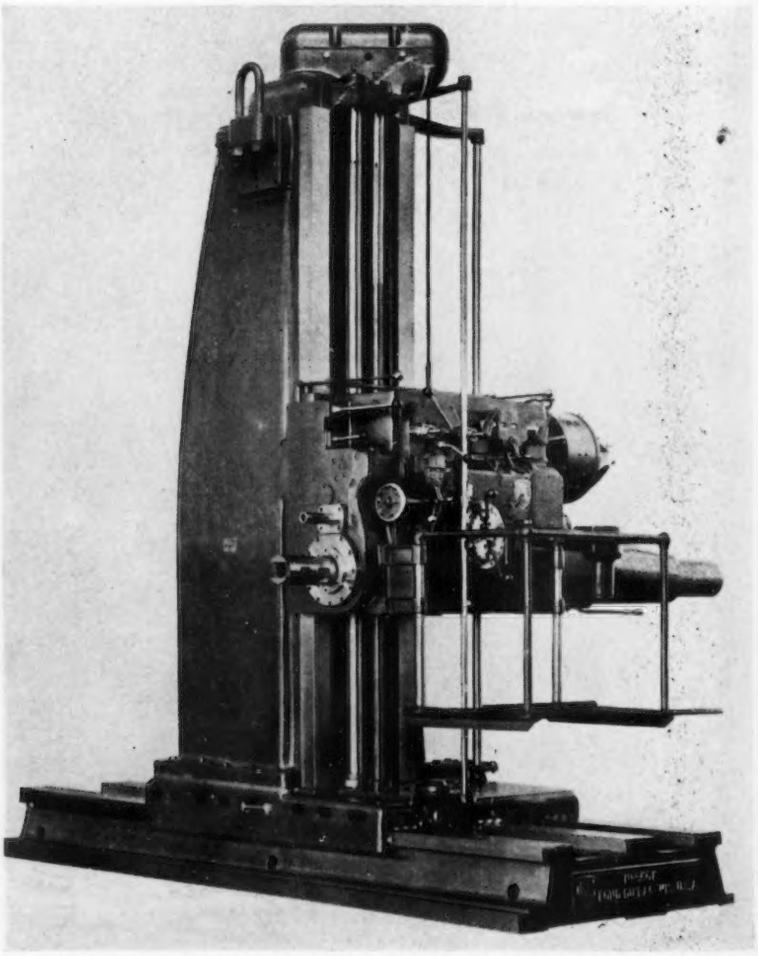
AT LEFT

FIG. 4—United Engineering 4-high non-ferrous mill using Cone gears on the screw-down.

BELOW

FIG. 6—The high speed spindle drive of this Giddings & Lewis boring mill is Cone gear equipped.





dle drive. Fig. 7 shows a Gorton universal machine with Cone-geared universal milling head. Fig. 8 shows a LO-Swing lathe on which Cone gears are used for the spindle drive. The operation is one of turning crankshafts, at one of the Chrysler plants.

Other Typical Applications

Cone worm gear drives on Chocton stokers in one of the plants of the Container Corp have been very satis-

tactory. These drives are classed as typically heavy duty, with interrupted service. In addition to longer life the Cone gears permit a much more compact installation.

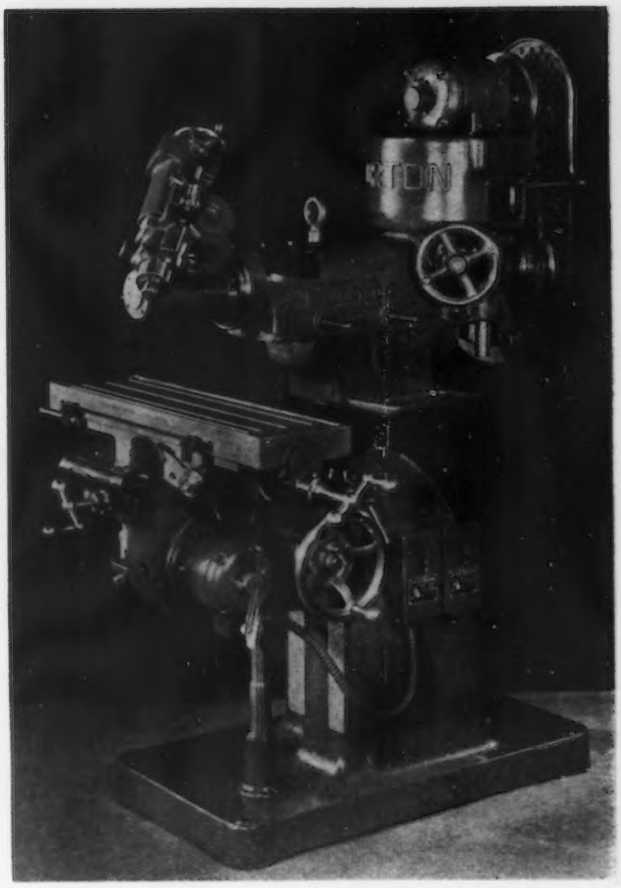
In Canada a Cone licensee, Dominion Engineering Co., has installed Cone gears successfully in sugar mill drives—one of the toughest of services. The reducers are remarkably compact for their capacity.

On the Emsworth Dam on the Ohio River in Pennsylvania, 29 Cone-geared speed reducers are installed, each responsible for lifting and lowering a half-million pound gate. These reducers have a center distance of 10 in., whereas 18 in. center distance conventional worm gear units would have been required for the same operation.

The compactness available through the high capacity of Cone gears is well illustrated in the mounting of a 6000 lb. pressure oil-well cement pump on a truck for portability. This development by the Halliburton Oil Well Cementing Co. would not have been possible with conventional gearing. The actual differences in center distances required were those cited as an example in the ninth paragraph of this article; namely, 15.619 in. for the Cone gear as against 27.000 in. for the conventional straight worm gear.

The Differential Steel Car Co. has found a satisfactory answer to certain mining locomotive drive problems in the Cone gear. Eight sets of Cone gears are now used on each locomotive —four to each truck.

In high-speed work Cone gears have achieved a considerable reputation. The best-known installation is for the drive on the Graham-Paige super-charger. Many thousands of these drives are in service, and not one has failed. Efficiency and quietness at speeds running up to 30,000 r.p.m. (step-up drive) were the factors governing the selection of the Cone type gear for this use.



AT RIGHT

FIG. 7—A Gorton universal machine with Cone geared milling head.

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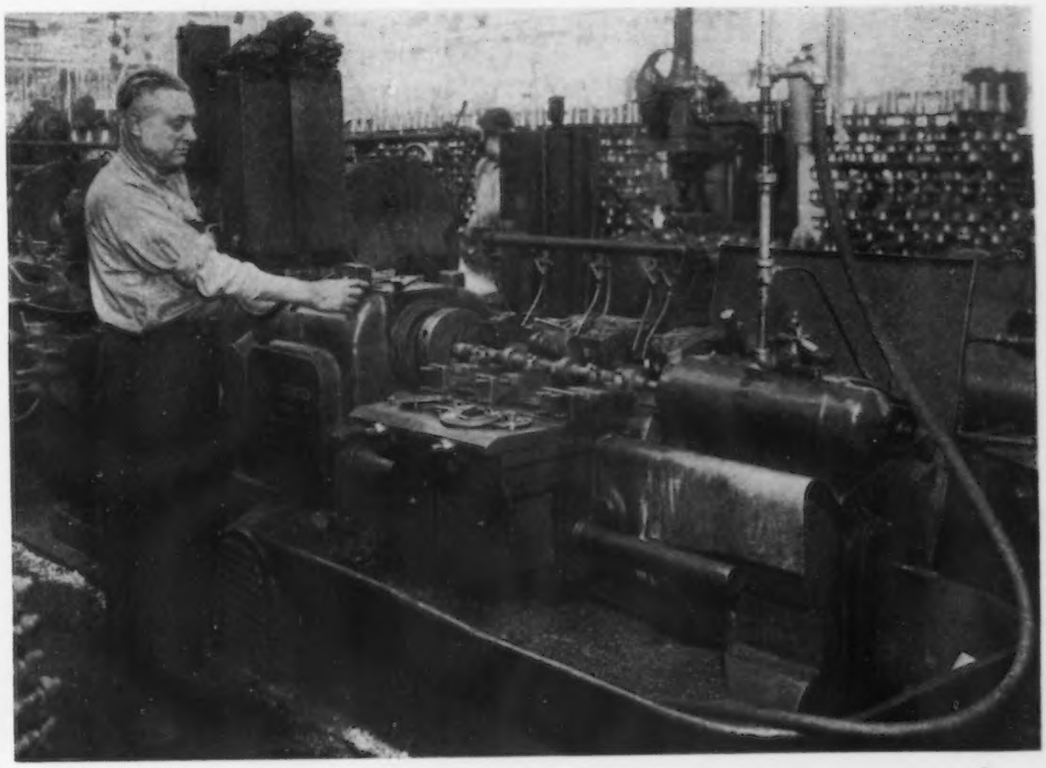
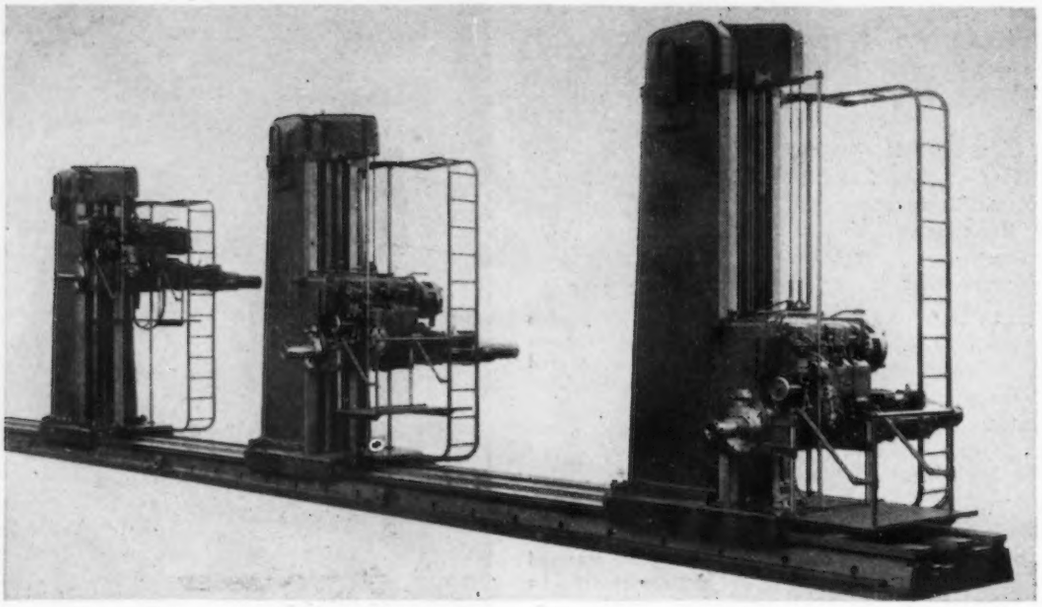
BELOW

FIG. 8—A Lo-Swing lathe on which Cone gears are used for the spindle drive.





115-Ton Triple Boring, Drilling and Milling Machine

THE unusual machine shown in the accompanying illustration called the 360-F, has recently been completed by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. It comprises three independently operated high power precision floor type horizontal boring, drilling and milling machines, each independently operated and mounted upon a base or runway 102 ft. in length.

This particular equipment, which weighs 230,000 lb. and which required six flat cars to ship, is used for simultaneous machining of large marine and industrial diesel engines, water turbines, generators, steam condensers and similar large units. It is also applicable in steel fabricating plants for the boring, milling and drilling of extremely large welded or riveted girders.

With the two outside machines placed at extreme distance, maximum spindle center distance is 90 ft., which means that operations can be carried on at any point within that range without the necessity of moving the work.

Each of the three machine units is equipped with a 6-in. diameter main spindle having a 48 in. continuous feed and also a 2-in. diameter high-speed auxiliary spindle having a 9-in. continuous feed. The main spindle on each machine has 36 speeds, varying from 6¼ to 375 r.p.m. and the auxiliary spindles have 36 speeds varying from 25 to 1500 r.p.m.

The entire mechanism for speed selection of spindles as well as the boring, drilling and milling feeds is incorporated in the headstock of each machine, which is operated through a dynamically balanced flange-type motor of 15 hp.

Directional control is applied to all operating levers, and speed and feed changes are through sliding gears and jaw clutches by means of rotary control levers. Direct reading dials are provided.

Rapid traverse is provided for each machine on the runway, or base, at the rate of 120 in. per min., as well as for each headstock on each column at the same rate. Safety devices and automatic lubrication are provided.

Welding Large Water Pipe-Line

(CONTINUED FROM PAGE 39)

point several hundred feet distant from a manhole.

The pipe ranges from ⅜ to 15/32 in. in thickness and is designed to handle head pressures up to 450 ft. It is coated inside with centrifugally-spun mortar and outside with a special gunite protective coating. After the heavy pipe sections are swung into place by gasoline-driven dragline units, the joints are welded and a field application of the protective coating is applied to them. Current is carried to the point of welding inside the pipe through 3-in. flanged openings in every fourth section of pipe. As the welding is completed these openings are plugged, the plugs are welded and finally protective coating is applied to the plugged areas.

The J. F. Shea Co., Inc., contractor, estimates that the time required for welding both inside and out, the joints of this large pipe averages about 1 hr. and 20 min. To save gasoline, the welding machines are equipped with a "slow down" device which automatically reduces the speed of the engine when running idle. The welding machines, including about 3,000 ft. of G-E Tellurium cable with embedded remote control wires, were supplied by the Victor Equipment Co., Los Angeles.

40,000 Celebrate Continuous Mill Anniversary at Ashland

JOHN B. TYTUS, inventor of the world's first continuous sheet mill, was decorated in the traditional Kentucky Derby manner becoming "a champion and a thoroughbred" when 40,000 residents of the Kentucky-Ohio-West Virginia tri-state sector declared a holiday to celebrate the fifteenth anniversary of the revolutionary mill developed by Tytus and associates of the American Rolling Mill Company at Ashland, Ky.

A GREAT industrial festival which rivaled in splendor and completeness the famous crop festivals of other parts of the country was held in Ashland, Kentucky, on October 19 in honor of John B. Tytus and the world's first continuous rolling mill which he and his American Rolling Mill Company associates helped develop there 15 years ago.

The program began with a parade in which more than 7000 persons passed in review before Geo. M. Verity, founder and board chairman of Armco; Charles R. Hook, Armco president; Mr. J. B. Tytus, Armco vice-president in charge of operations; Governor A. B. Chandler of Kentucky, and other prominent industrial and civic leaders.

Talks in the afternoon were given by John H. VanDeventer, editor of IRON AGE; Charles R. Hook; Gov. Chandler, and C. S. Lake, assistant to the president of the Chesapeake & Ohio Railroad. These speakers stressed mainly the advantages which the continuous rolling process has brought to the average person; how by halving the cost of sheet metal, it has increased the purchasing power of all sheet steel consumers by 100 per cent.

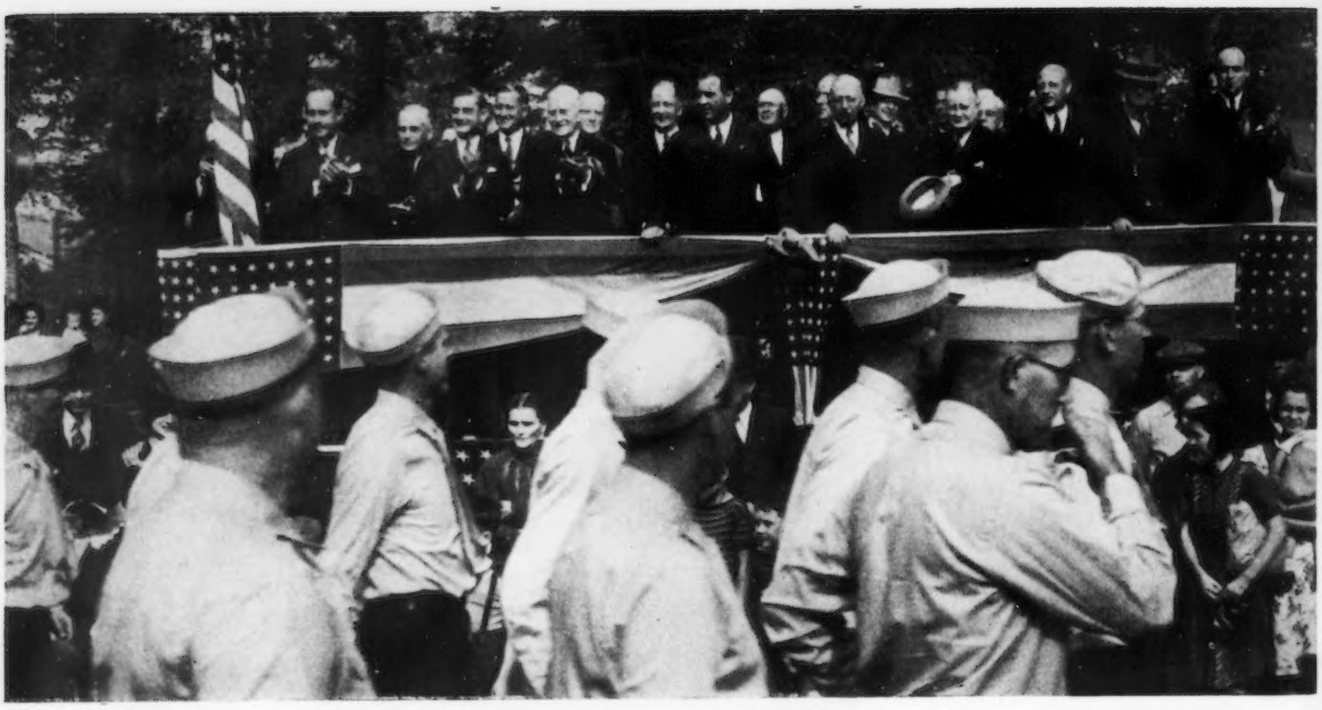
As Mr. VanDeventer pointed out, "The 1937 output of sheet and strip meant a saving to American steel consumers of $576,000,000 just for that year alone, and it has actually meant more steel workers on the payroll of every steel company having a continuous mill than in 1923, and a decided increase in wages."

Mr. VanDeventer characterized the development of the continuous rolling process as the answer to the most urgent of present and future needs—"the need for a low-cost method of producing the most flexible and versatile of all materials, sheet metal."

As proof that the continuous process has provided more jobs at higher pay, Mr. Hook pointed out a 31 per cent increase in the number of steel workers from the boom year of 1929 when they totaled 458,887 to 1937 when they numbered about 600,000, and an average wage which in Ashland had increased from 67 cents an hour in 1923, before the continuous process was perfected, to over $1 an hour today.

"This increase in wages was made possible," Mr. Hook explained, "by introducing proper skill and team work where muscle was the principal basis of reward before. With continuous rolling, the employee is responsible for machinery costing thousands of dollars and can produce a larger quantity of sheets than was ever possible under the old method. Since, in the final analysis, all wages come from production, it is only just and fair that the more a man produces, the more he should earn."

Gov. Chandler pointed out the good that the Armco organization had done in the Ashland tri-state area as a glowing example of what American industry was capable of accomplishing if unhampered by governmental interference. "I believe it is the business of government to support instead of hinder industry which makes it possible for so many American citizens



CHEERED by the spectacle of 40,000 residents of the Kentucky-Ohio-West Virginia tri-state sector who turned out to celebrate the fifteenth anniversary of the world's first continuous sheet mill at Ashland, Ky., executives of the American Rolling Mill Co. applauded school children, boy scouts, Armco employees and civic groups who passed the reviewing stand in an hour-long parade. This view, taken as the company's own employees appeared, shows (left to right) Calvin Verity, executive vice-president and general manager; J. C. Miller, vice-president; Charles R. Hook, president; Bennett Chapple (the Iron Master of radio), vice-president; George M. Verity, founder and chairman; John B. Tytus, vice-president and inventor of the continuous rolling process; John H. VanDeventer, editor of The Iron Age, and Governor A. B. "Happy" Chandler of Kentucky. The group on the right in the reviewing stand includes civic, railroad and company leaders.

to live and prosper," he said, continuing, "I thoroughly believe in home rule for Kentucky and Kentucky industry."

An interesting sidelight on the afternoon celebration came when the speaking program was interrupted for the presentation of a giant floral horseshoe to Mr. Tytus by two attractive young women who represented the wives of Armco employees and Ashland business men.

In making the presentation they said: "It is customary in Kentucky to honor the winner with a floral horseshoe. This always goes to a thoroughbred and a winner. This afternoon, representing the women of Ashland, we want to present Kentucky's highest honor to a thoroughbred and a real winner, Mr. John B. Tytus, inventor of the continuous process for rolling iron and steel sheets."

This gala celebration at Ashland ended with a huge street dance for the public, and a banquet attended by more than 300 civic and industrial leaders of the community. Speakers included Geo. M. Verity; W. C. Hull, vice-president of the Chesapeake & Ohio Railroad; Calvin Verity, executive vice-president and general manager of Armco, and J. C. Miller, Armco vice-president in charge of raw materials purchases.

Philosophizing on cooperation which has been the basis of Armco's development from the beginning, G. M. Verity pointed to the continuous mill as an achievement in which "every man who could be expected to make a contribution, no matter how small, was given the opportunity.

"The whole problem had to be studied, guided and directed by master minders, as is usual in all such undertakings, yet it was the contributions and cooperation of the many that made the project successful beyond all first hopes or anticipations.

"Failure—though other groups had failed — was impossible under such broad cooperative methods as were engendered within the ranks of a new division in our growing industrial organization and throughout the entire community of Ashland in which they lived and worked."

Mr. Verity then drew an interesting parallel between such examples of industrial cooperation, and the need for cooperation between individuals and governments. "Conflict and destruction of life and property cannot be driven from the boundaries of any nation until the adoption of national policies, plans and programs that will replace human hatreds with human kindness, and substitute cooperation and good-will.

"We are passing through a period of great economic, social and political readjustment in which many minority or pressure groups are challenging the very foundations of our Democracy. There are those who wish to force their ideas upon our people whether they will have them or not. Granted the ideals and objectives of some minorities may be most worthy, they can never be successfully established by force.

"While listening to the many new theories constantly being proposed, we should always remember this: That no human plan is perfect and that whatever the weaknesses in our social and economic structure, it has given more human beings a chance for individual development, and has more widely distrbuted the fruits of commerce and industry, than has any other system in the whole history of the world!"

THIS WEEK ON THE ASSEMBLY LINE

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By W. F. SHERMAN
Detroit Editor

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. . . Auto production gains one-third in week . . . Jump estimate to 3,500,000-4,000,000 cars for 1939 . . . Leaf spring improvements effected in industry . . . Chevrolet price cuts range up to $45.

DETROIT.—Another sharp upswing in automobile production —amounting to an increase of more than one-third over the previous week's—was chalked up for the week period ended Oct. 21. Greater production, spurred by a boom-year buying interest in new cars, was accompanied by plans to recall to work about 50,000 workers and the restoration of full-sized pay envelopes to the thousands of General Motors and Chrysler white-collar employees.

High production, mass reemployment and bigger pay checks are good indications of the automobile industry's high hopes that it will exceed earlier estimates of car output. The public's acceptance of 1939 models and the vigor with which the automobile industry is tackling its problems brought a prediction late last week from Ward's Automotive Reports that the total output of cars and trucks during 1939 would reach between 3,500,000 and 4,000,000 units. Previous estimates within the industry have ranged from 2,750,000 to a peak of 3,500,000, which is now put down as the minimum.

During the past week Plymouth and Chevrolet each geared itself to turn out an extra 3000 cars, the Plymouth output touching 10,000 units and Chevrolet assembling 20,000. In so doing, their group standings were pushed up, the Chrysler output being approximately 15,000 while General Motors built 31,925 units. Ford, accelerating its assemblies, tripled the number of units assembled, turning out 12,850 cars, including about 350 in the Zephyr plant. The result was a new high for the 1938 production year. The industry completed 68,360 cars and trucks, compared with 50,540 the previous week. In the comparable period last year 91,905 units were built.

Further Gains Expected

Plans of the industry call for increasing production activity for at least two more weeks. The last week marked the fifth consecutive period of gain.

Graham-Paige Motors Corp., one of the last to get into steady production, rolled its first 1939 car off the assembly line more than a week ago.

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ALFRED P. SLOAN, Jr., chairman of General Motors Corp.; Harlow H. Curtice, vice-president of the Buick company, and Albert Bradley, vice-president and chairman of the GM finance committee, look approvingly at the new streamlined hood of the 1939 Buick car.

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This manufacturer is planning to complete 650 cars for the two-week period ending Oct. 31.

Last Monday, the Ford Motor Co. permitted the first official viewing of the new Mercury and the Ford V-8 for 1939. The entire day was devoted to the preview program, starting with a visit to the Rouge plant laboratories in the morning to witness demonstrations of Ford developments. En route to the laboratory the guests inspected the new press shop where Ford body stampings are being made, the tire plant, tool and die shop and other new units embraced in the $34,000,000 Ford plant building program. At luncheon, Ford officials met the press at the Ford rotunda and unveiled the new cars after luncheon. In the afternoon the company threw open the gates to the new proving ground test track at the Ford Airport and staged demonstrations in the giant new weather tunnel where aerodynamics and weather effects on automobiles can be studied simultaneously.

Upswing May Stop 32-hr. Demand

It is generally expected that General Motors' announcement of the rehiring of 35,000 production men by the end of October will forestall any union attempt to win the 32-hr. week, and at Chrysler the rehiring of 8000 men after the recent parley with UAW leaders apparently had the same effect, because the return of men to their jobs has stifled complaints about the length of the work week. Fortunately, it looks as though there will be a steady upward trek in employment as well as production for weeks to come. Unfilled orders in the industry are estimated at approximately 80,000 for Plymouth, 45,000 for other Chrysler divisions and 200,000 for General Motors. Field stocks at the end of September were estimated at 90,000 units, compared with 270,000 a year ago. According to Ward's, field stocks currently are at the lowest point since the end of 1933.

The variety of solutions which engineers have found in studying the problem of smooth ride characteristics is worthy of comment. Most every manufacturer has made some changes in springs, shock absorbers and suspension systems as a whole. One of the simplest effective systems is that perfected for the LaSalle and Cadillac car. The principal change comes in a relocation of the ends of the leaf springs which are now mounted higher and inside the frame. Periodic axle "hopping" has been practically eliminated by the mere fact that spring shackles are installed on angles so that the main leaf of the spring is put in compression. Semi-elliptic rear springs are used, mounted in rubber bushings so no lubrication is required. Without compromising on the necessity for soft springs, Cadillac-LaSalle engineers have designed a system which also gives very satisfactory roadability. There are no special "ride" devices incorporated. As a matter of fact, the system is as simple as any of the old time automobile suspension methods. It consists of just two sets of springs with shock absorbers, of course.

More comment about the Pontiac variable rate rear spring: Spring engineers are demonstrating with a small block of rubber (an ordinary eraser will do for demonstration) how Pontiac has reduced spring failures and at the same time decreased the weight of its rear springs. Flex the eraser and watch the middle. The rectangular cross-section changes to an arc with the edges sticking upward. Along these highly stressed edges cracks and failures start. Pontiac has tapered the edges so the cross-section of the spring leaf is tapered at each side, preventing the formation of a highly stressed section. At the same time, the material that has been removed decreases the weight.

Chevrolet's Leaf Springs

Chevrolet, which has coil spring (knee-action) suspension in the front of its Master Deluxe line of cars, retains the conventional leaf springs at the front of the standard line of cars. Exactly the same springs are used on the rear of both lines of cars. This year the leaf springs on the front of the standard car are thinner and are tapered. Deflection rates are reduced from 235 lb. per in. to 175 lb., and the rate of oscillation dropped from about 140 to less than 100. This makes the rate of the front springs almost equal to the rate of the rear springs and the ride has been noticeably improved.

The results attained with leaf springs on these and many other 1939 models lead one to the conclusion that not all the possibilities of leaf springs have been explored.

Price reductions in the auto industry are so common this fall that it seems unnecessary to repeat the fact that each announcement of new models

THE BULL OF THE WOODS — BY J. R. WILLIAMS

YOU YOUNG GUYS MAKE ME LAUGH -- YOU COME HERE FULL OF AMBITION TO BE PRESIDENT OF TH' COMPANY SOME DAY.... LOOKIT ME - I BEEN HERE TWENNY YEARS! YOU GOT TO WAIT TILL SOMEBODY KICKS TH' BUCKET - THEN YOU GOT ONE CHANCE IN A THOUSAN'!
WELL, THAT'S NOT A BAD GAMBLE
OL' GUS, THERE, SPENDS HALF HIS PAY ON DERBY TICKETS, AN' HE THINKS ONE CHANCE IN A THOUSAN' IS NO CHANCE A-TALL -- HIS DERBY TICKETS ARE ONE CHANCE IN FIFTY MILLION!
YEH, AND HE'S GETTIN' PAID FER HIS CHANCES HERE, BUT HE USES HIS PAY TO PAY FER ONE CHANCE IN MILLIONS - HE THINKS THAT'S A GOOD GAMBLE
J.R.WILLIAMS
BAD MEDICINE AND GOOD
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brings with it the announcement of lower prices. However, there are certain key companies worth watching. Chevrolet, for instance, announced its new cars last Saturday with price reductions ranging up to $45. These are among the steepest in the industry in the small car field and are very much in line with the figures which were predicted in the Assembly Line months ago.

Twelve new diesel models, six conventional type and six cab-over engine models, all powered with the new General Motors diesel engines, were announced Monday by General Motors Truck & Coach Division. At the same time, Dodge Truck Division of the Chrysler Corp. announced its entry into the diesel field with a three-ton truck powered with a new Chrysler diesel engine.

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Industry Speaks

"Everything is on the rise. I'll bet anyone even money there will never be another war."—HENRY FORD.

"In comparison with the conditions prevailing during the first half of the year 1938, the current performance of industry is a cause for some gratification, and the outlook for the nearby future holds promise of further improvement."—BENJAMIN F. FAIRLESS.

"I cannot afford to abide by it (the Federal Wage-Hour Law), and I defy them to enforce it. If they attempt to crush me, I will do my level best to put their impractical notions to the acid test of public opinion in every hamlet in America."—FRED C. PERKINS, York, Pa., battery firm owner.

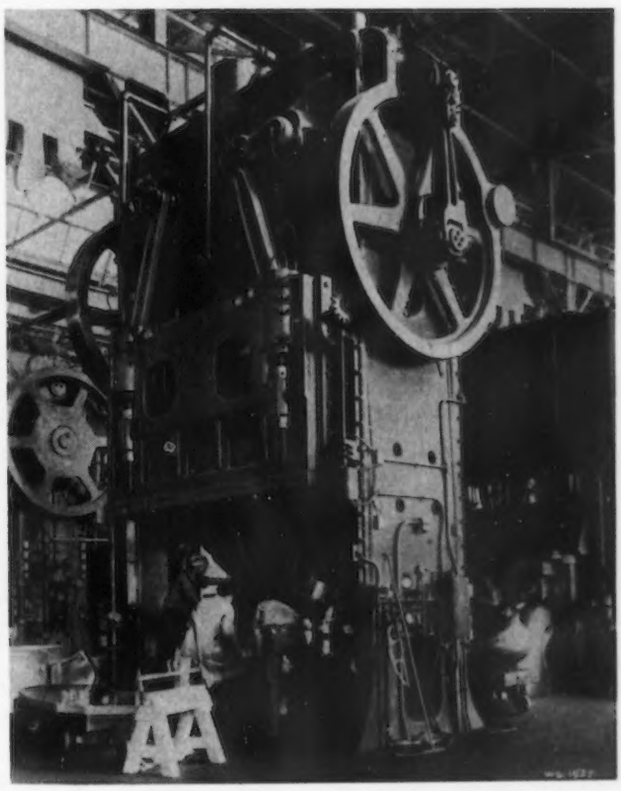
Industry Listens

"I look to see the relief curve in America go down at an early date despite what some of our political enemies think. The old charge that we shove up the rolls before the elections and bring them down afterward is a lot of nonsense."—HARRY L. HOPKINS.

"This has been a red-letter day (Oct. 25, effective date of Wage-Hour Law) in the history of American industry-labor relations. Today marks one of our most notable advances in our national effort to improve economic conditions in the United States."—ELMER F. ANDREWS, Wage-Hour Law administrator.

BELOW

AMONG the 44 new presses recently added at the DeSoto stamping plant is this double crank toggle used for fender stamping. The bed measures 109 x 72 in.



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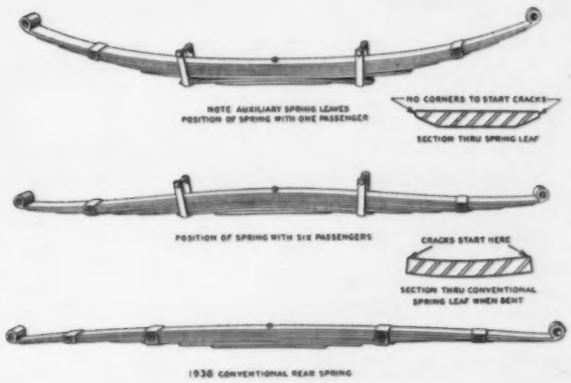
BELOW

1939 Pontiac variable rate rear spring, an outstanding contribution in the field of leaf spring design. Whether the car carries five passengers or one, the ride characteristics of the car are unchanged.


NOTE AUXILIARY SPRING LEAVES
POSITION OF SPRING WITH ONE PASSENGER
NO CORNERS TO START CRACKS
SECTION THRU SPRING LEAF
POSITION OF SPRING WITH SIX PASSENGERS
CRACKS START HERE
SECTION THRU CONVENTIONAL SPRING LEAF WHEN BENT
1938 CONVENTIONAL REAR SPRING

Current Metal Working Activity

Latest Data Assembled by THE IRON AGE from Recognized Sources

	September 1938	August 1938	July 1938	August 1937	Eight Months 1937	Eight Months 1938
Steel Ingots: (gross tons)						
Monthly output[a]	2,657,748	2,546,988	1,982,058	4,861,789	38,193,090	15,348,190
Average weekly output[a]	620,969	574,941	448,429	1,097,469	1,100,030	442,056
Per cent of capacity[a]	46.28	42.85	33.42	83.55	83.75	32.94
Pig Iron: (gross tons)						
Monthly output[b]	1,680,435	1,493,995	1,201,785	3,605,818	26,811,269	10,568,806
Raw Materials:						
Coke output[c] (net tons)	2,730,789	2,544,571	2,220,212	4,829,862	37,056,796	19,985,229
Lake Ore consumed[d] (gross tons)	2,313,865	2,076,819	1,674,721	5,373,264	39,983,700	14,467,827
Castings: (net tons)						
Malleable, orders[e]		25,752	16,905	49,376	425,587	155,277
Steel, orders[e]		24,814	36,641	54,753	724,742	213,180
Finished Steel: (net tons)						
Trackwork shipments[a]	2,346	2,838	2,242	7,530	69,790	25,058
Fabricated shape orders[f]		102,539	87,154	124,897	1,202,037	679,793
Fabricated plate orders[e]		22,069	27,773	31,763	310,488	196,286
U. S. Steel Corp. shipments[g]		558,634	441,570	1,107,858	9,908,884	4,010,558
Fabricated Products:						
Automobile production[h]		96,936	150,444	405,072	3,779,451	1,553,412
Construction contracts[i]		$313,141‡	$239,799‡	$285,104‡	$2,100,358‡	$1,847,212‡
Steel furniture shipments[e]		$1,677‡	$1,480‡	$2,114‡	$18,622‡	$13,257‡
Steel boiler orders[e] (sq. ft.)		782,665	691,371	937,240	7,452,319	4,905,978
Locomotives ordered[j]	5	18	3	39	270	96
Freight cars ordered[j]	1,079	303	0	1,490	46,610	8,327
Machine tool index[k]	117.4	120.9	89.6	179.8	180.9	93.6
Foundry equipment index[l]	78.7	83.3	74.2	257.5	229.9	73.6
Exports: (gross tons)						
Total iron and steel[m]		242,139	263,699	886,377	5,318,530	3,421,517
All rolled and finished steel[m]		100,488	100,671	203,038	1,322,275	921,525
Scrap[m]		106,883	125,399	473,933	3,028,795	2,017,654
Imports: (gross tons)						
Total iron and steel[m]		20,041	14,728	61,489	406,115	153,754
Pig iron[m]		961	936	7,952	76,127	22,262
All rolled and finished steel[m]		13,691	11,130	25,362	212,396	106,311
British Production: (gross tons)						
Pig iron[n]	429,800	443,000	507,800	712,600	5,452,900	4,956,200
Steel ingots[n]	754,700	658,900	683,200	987,700	8,385,300	7,268,600

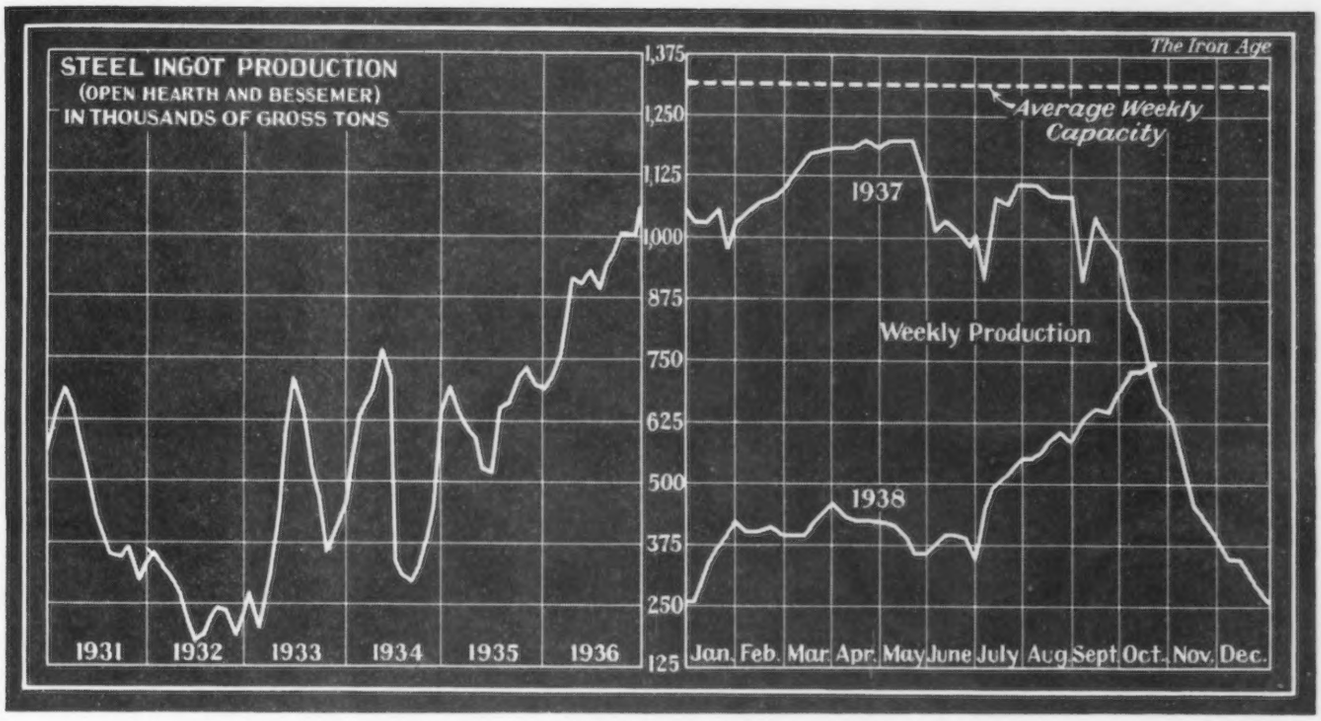
†Three months' average. ‡000 omitted.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary figures from the Automobile Manufacturers Association—Final figures from Bureau of the Census, U. S. and Canada; [i] F. W. Dodge Corp.—37 Eastern states; [j] *Railway Age;* [k] National Machine Tool Builders Association; [l] Foundry Equipment Manufacturers Association; [m] Department of Commerce; [n] British Iron and Steel Federation.

Weekly Bookings of Construction Steel

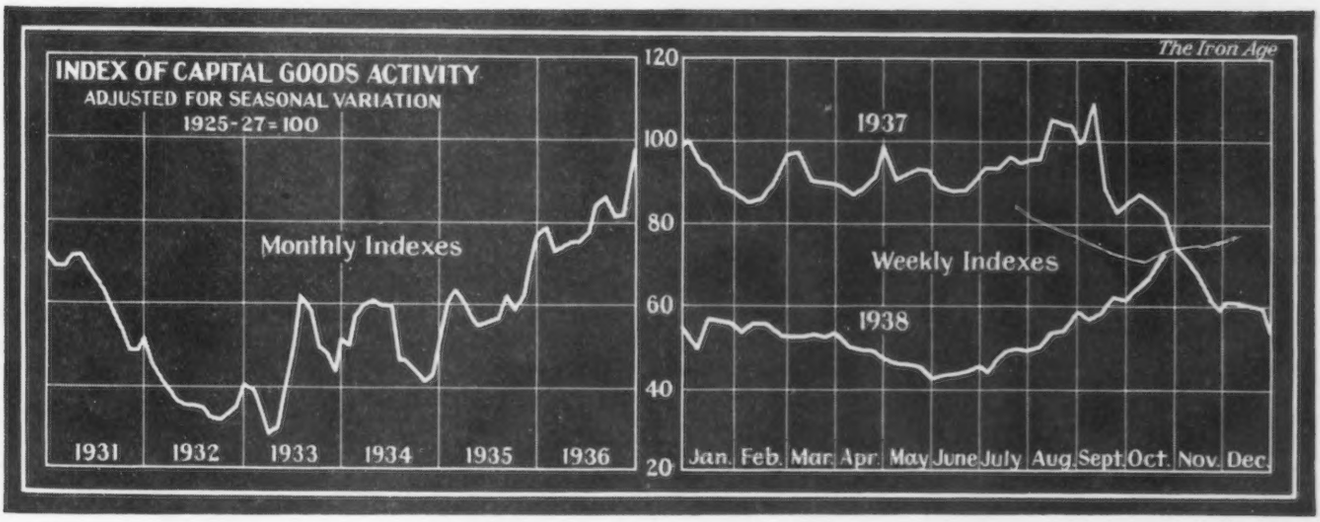
	Week Ended				Year to Date	
	Oct. 25, 1938	Oct. 18, 1938	Sept. 27, 1938	Oct. 26, 1937	1938	1937
Fabricated structural steel awards	33,350	11,900	22,225	23,400	727,820	910,585
Fabricated plate awards	2,080	11,790	1,015	1,870	113,510	107,530
Steel sheet piling awards	800	705	0	0	37,865	37,395
Reinforcing bar awards	8,200	11,015	6,185	2,700	272,165	233,665
Total Letting of Construction Steel	44,430	35,410	29,425	27,970	1,151,360	1,289,175

Ingot Output Jumps 3 Points to 54 Per Cent



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Wheel-ing	Buffalo	Detroit	Southern	S. Ohio River	Western	St. Louis	East-ern	Aggre-gate
	CURRENT WEEK..	42.0	46.5	61.0	31.0	72.0	78.0	49.0	77.5	49.0	55.5	50.0	49.0	40.0	**54.0**
	PREVIOUS WEEK..	39.0	46.0	56.0	31.0	59.0	76.0	49.0	77.5	49.0	55.5	50.0	48.0	75.0	**51.0**

Index Continues to Gain; Rises 4½ Points in the Week



BOLSTERED by gains in every component of the index except the steel production series, THE IRON AGE index of capital goods activity forged ahead 4.5 points to 73.2 in the week ended Oct. 22. This is the highest index position reached since the week of Oct. 30, 1937. It is of interest to note that the loss in the steel output series was in keeping with the normal seasonal trend. Any gains in the ingot rate over the balance of the year will be contrary to normal seasonal experience. A gain of 35 per cent in automobile assemblies in the past week boosted the automobile index 16 points to 96.4, the highest point reached by this series since the week of Nov. 6, 1937.

	Week Ended Oct. 22	Week Ended Oct. 15	Comparable Week 1937	Comparable Week 1929
Steel ingot production[1]	71.4	71.6	77.0	114.2
Automobile production[2]	96.4	80.4	129.6	122.0
Construction contracts[3]	77.2	74.5	54.4	105.1
Forest products carloadings[4]	59.3	57.6	67.8	117.7
Production and shipments, Pittsburgh District[5]	61.8	59.2	83.8	116.5
Combined index	**73.2**	**68.7**	**82.5**	**115.1**

Sources: 1. THE IRON AGE; 2. Ward's Automotive Reports; 3. *Engineering News-Record;* 4. Association of American Railroads; 5. University of Pittsburgh.

THIS WEEK IN WASHINGTON

. . . Scattered minority of employers fights to discredit Wage-Hour Law, Administrator E. F. Andrews says . . . Republic Steel to appeal Labor Board decision, attacks NLRB ruling that company must reimburse Government for aid given strikers by relief agencies.

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By L. W. MOFFETT

Resident Washington Editor
The Iron Age

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WASHINGTON.—The Wage-Hour Administration shares with industry interest and concern over the effect of the Fair Labor Standards Act, which became operative on Oct. 24. A series of regulations and definitions were rushed out by Administrator Elmer F. Andrews in preparation for putting the law into effect and followed a statement by Mr. Andrews that a "small and scattered minority" is trying to bring the act into dispute.

The larger industries, such as steel and automotive, which are expected to be affected remotely by the act, unless through requirement to pay time-and-half for overtime, have made no representations against the law, regardless of their views as to the practicability of operating the involved machinery that will be built up under it.

Mr. Andrews' irritation arises from reports from various sections that some of the smaller industries had announced that they would close down because of inability to maintain payrolls at the minimum wage of 25c. an hr. which automatically became mandatory with application of the law.

Finds Most Cooperate

Mr. Andrews expressed pleasure at what he said was the cooperative spirit he had been assured by "the overwhelming majority of employers, employees and other persons affected by the act." To those who, he said, were not willing to cooperate, Mr. Andrews warned that the law provides severe penalties for its violation and that his division has no choice but to carry out the will of Congress.

One regulation provides that overtime pay above 44-hr. a week must be compensated for in cash at one and one-half times the regular rate paid before the law went into effect, if that rate was in excess of 25c. an hour. The regulation said that an employer who reduced hourly rates in anticipation of a sudden rush of business would be responsible for overtime at the original rate "because the change was an obvious subterfuge to avoid the effects of the maximum hours provision."

Overtime at Old Rate

It was ruled that it is the employers' regular rate of pay on which time and a half is based and not any minimum set in the act. An employer purporting to reduce rates of pay but guaranteeing the same total wages as those paid before the law went into effect, the regulations said, must also pay overtime at the old rate.

It was pointed out also that an employer who induced his employees to accept a reduction in wage rates on the strength of the maximum hours provision might find that a court would hold the original higher rate of pay the regular rate of pay.

It was stated that the law does not provide for an 8-hr. day but limits hours on the basis of a normal work week, with provision for time and one-half overtime pay. The regulations said hours lost in one week could not be made up in the next week, whether lost because of holidays, sickness, vacations or insufficient business, without payment of the overtime rate for working in excess of 44-hr. a week.

Areas of Production

Definitions were also issued defining overtime and the "area of production" as used in exempting agricultural and dairy and certain other groups of workers and on determination of the cost of board and lodging. In defining the cost of board and lodging the regulation said that the "reasonable cost does not include a profit to the employer or to any affiliated person."

Another regulation defined a seasonal industry as one "which engages in the handling, extracting, or processing of materials during a season or seasons occuring in regularity, annually recurring part or parts of the year; and ceases production, apart from such work as maintenance, repairs, clerical and sales work, in the remainder of the year because of the fact that, owing to climate or other natural conditions, the materials handled, extracted or processed, are not available in the remainder of the year."

The Administrator said that conceivably an industry might have several branches, each of which might be considered as an "industry" for the purposes of seasonal exemption. "Economic facts of the situation presented," it was stated, will govern rulings on a seasonal industry in borderline cases.

Regulations were issued covering child labor and provide that for six months pending permanent plans for cooperation, age certificates issued by designated cooperating states will have the same force as Federal certificates.

Navy to Open Nickel Bar Bids on Nov. 1

WASHINGTON.—The Navy Department will open bids on Nov. 1 for 170 tons of nickel steel bars for delivery to the Boston Navy Yard, and on Nov. 4 bids will be opened for 214 tons of bar and strip steel for delivery at the Charleston, S. C., Puget Sound, Wash., and Boston Navy Yards.

CAPTURING

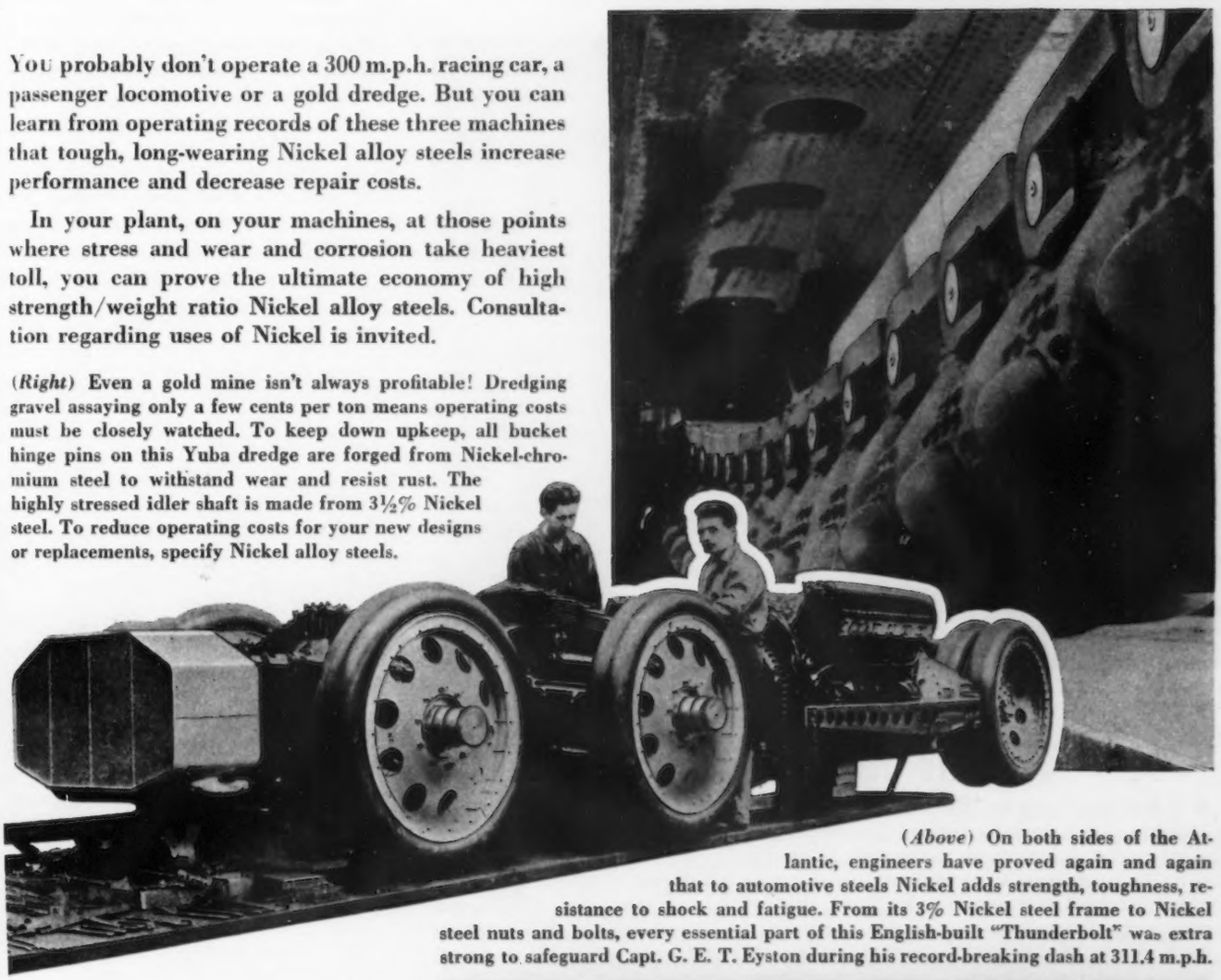
hidden gold, split-seconds

and maintenance records with NICKEL ALLOY STEELS

You probably don't operate a 300 m.p.h. racing car, a passenger locomotive or a gold dredge. But you can learn from operating records of these three machines that tough, long-wearing Nickel alloy steels increase performance and decrease repair costs.

In your plant, on your machines, at those points where stress and wear and corrosion take heaviest toll, you can prove the ultimate economy of high strength/weight ratio Nickel alloy steels. Consultation regarding uses of Nickel is invited.

(*Right*) Even a gold mine isn't always profitable! Dredging gravel assaying only a few cents per ton means operating costs must be closely watched. To keep down upkeep, all bucket hinge pins on this Yuba dredge are forged from Nickel-chromium steel to withstand wear and resist rust. The highly stressed idler shaft is made from 3½% Nickel steel. To reduce operating costs for your new designs or replacements, specify Nickel alloy steels.



(*Above*) On both sides of the Atlantic, engineers have proved again and again that to automotive steels Nickel adds strength, toughness, resistance to shock and fatigue. From its 3% Nickel steel frame to Nickel steel nuts and bolts, every essential part of this English-built "Thunderbolt" was extra strong to safeguard Capt. G. E. T. Eyston during his record-breaking dash at 311.4 m.p.h.

(*Right*) Railroads have speeded up schedules and lowered operating costs by redesigning rotating and reciprocating engine parts and specifying Nickel alloy steels. New York Central tests proved that such rebalancing of mainline locomotives lessens rail pound at high speeds—and cuts track maintenance costs as much as 50%. You, too, may discover unexpected savings by using Nickel alloy steels.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

More Express Highways Needed In United States, V. G. Iden Says

WASHINGTON. — Declaring that the greatest need today in highway building is to construct express highways that will carry motor traffic through congested centers, V. G. Iden, secretary of the American Institute of Steel Construction, told the United States Chamber of Commerce industry conference here last week that the few samples of elevated highways already constructed demonstrate the economy and efficiency of such through roads. Delay in building more highways of this character was held to be "probably due" to inability of the cities alone to finance the improvements.

Because car owners living in cities are already paying the bulk of automobile taxes collected by both the state and Federal governments, Mr. Iden said it is unfair to expect the cities to assume full responsibility of financing such highways. Mr. Iden urged construction of such highways not only for economic reasons but also as a safety factor, asserting that at least 75 per cent of all accidents in urban areas are against pedestrians. This class of accident, he said, would be eliminated entirely by elevated highways.

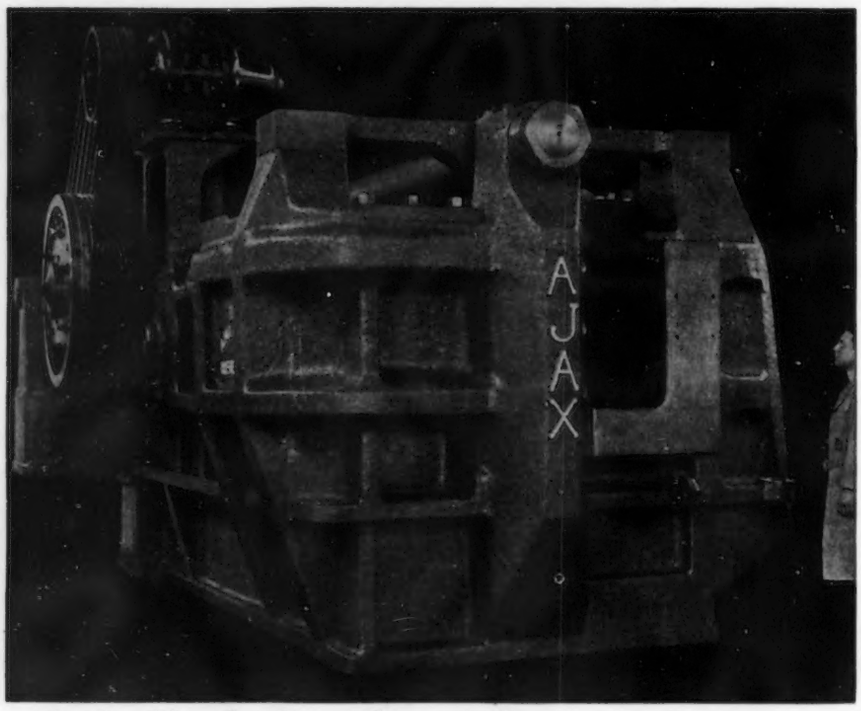
The construction industry, said Mr. Iden, should give the problem careful study "because it means a volume of work the like of which could only be equaled by our skyscraper-building era."

The New York World's Fair will have at least two important effects upon the construction industry — the immense amount of material required, and the exhibition of building materials together with the effect of a complete housing demonstration upon home desires of visitors to the fair, said Leslie S. Baker, director of exhibits, Flushing, N. Y.

Included in requirements for materials were the following: 28,500 tons of steel; 2900 tons of iron and steel pipe and tile; 308 miles of piling; 15,000,000 sq. ft. of walls; 17 miles of roads; 13 miles of gas mains; 15 miles of electrical ducts; 34 miles of walks; 3,000,000 sq. ft. of building area—70 acres or over 20 city blocks.

Russell G. Creviston, director of advertising and sales promotion of Crane Co., and president of the Producers Council, Chicago, told the conference that it is evident from an incomplete survey that there will be a considerable amount of promotional effort by manufacturers in 1939. He observed that it is interesting to note that these efforts are stressing product less and less and general industry promotion to a greater degree. This change in method was attributed to a desire on the part of manufacturers to present, insofar as possible, a complete service or package to the public.

Mr. Creviston cited services and programs of different suppliers and associations to show that the trend is away from individual product promotion and in the direction of complete services. Among concerns which he named were the American Radiator Co., Inc., Crane Co., the Westing-



A Puff of Air Operates

This Huge Forging Machine!

● A feather touch on the foot valve—a puff of air—and this huge Forging Machine swings into action! Thousands of times a day in the world's most progressive forge shops, the Ajax Air Clutch is repeating its cycle —daily setting new production records on all types of upset forgings.

Introduced and patented by Ajax, the Air Clutch won immediate favor with experienced forge men who term it the greatest single improvement in Forging Machines in twenty years. Its smooth, cushioned starting action and instantaneous treadle response has increased production as much as 25% — decreased fatigue of the operator — and totally relieved the machine of damaging clutch impact.

If you are interested in speeding up your forging operations, improving your product and lowering your costs, write today for further information on Ajax Air Clutch Forging Machines — Bulletin No. 65.

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND
621 MARQUETTE BLDG., CHICAGO • 201 DEWART BLDG., NEW LONDON

AJAX

house Electric & Mfg. Co., and the Johns-Manville Corp.

The construction industry is now in a new recovery cycle, said Thomas S. Holden, vice-president of the F. W. Dodge Corp., and president of the New York Building Congress.

"While we do not now see on the horizon any such extraordinary combination of circumstances as those which produced the great 1925-1929 building boom, it does look today as if volumes equal to those of 1922, 1923, and 1924, healthy post-war recovery years, may be attainable within the next five years, unless prevented by international conditions beyond the control of the people of the United States," Mr. Holden said.

He outlined the potential development of a modern large-scale housing industry, possible expansion of the electric utility industry and opportunities for supplying new needs of manufacturing and commerce, and continuing demands for public improvements.

As a by-product of the conference, yet considered equally as important as the main convention, was an executive session of representatives of management and labor, the first of the kind ever held, to consider labor relations as they bear on the construction industry. Annual wages, which have administration support; regulations for apprentices, jurisdictional disputes and stabilization of material prices and labor costs were discussed by the two groups. The labor contingent consisted of officials of the building trades department of the American Federation of Labor. The management group included contractors, producers of building materials, mortgage finance representatives, architects and associated interests.

Chairman of the meeting was A. C. Tozzer, vice-president of the Turner Construction Co., New York. The AFL officials are said to have strongly opposed the idea of an annual wage. In order that the labor officials might consult their headquarters, a resolution was adopted providing for a future conference at a date to be fixed by the chamber of commerce.

NLRB Certifies CIO For Indiana Workmen

WASHINGTON.—The National Labor Relations Board has recognized the Amalgamated Association of Iron, Steel and Tin Workers Union, a CIO affiliate, as the exclusive collective bargaining representative for 226 employees at the Ingram-Richardson Mfg. Co., Frankfort, Ind.

High Court Denies Ruling on Prices

WASHINGTON.—The Supreme Court has denied a petition asking a ruling on the Robinson-Patman Anti-Price Discrimination Law, thus apparently delaying at least for the time being any chance of clarifying the controversial brokerage section of the act.

The Biddle Purchasing Co., of New York, which sought the ruling, filed a brief with the Supreme Court on Sept. 3 after the Second Circuit Court of Appeals upheld a Federal Trade Commission cease and desist order against the company. The FTC also filed a memorandum with the Court, pointing out that the case merits review and raises questions of general importance that should be decided by the Supreme Court. Several other cases are pending before the Commission involving substantially the same question.

A-E-CO
HELE-SHAW
Fluid
POWER
PUMPS, MOTORS & TRANSMISSIONS

Hele-Shaw Fluid Power is oil under pressure—pressure that *holds!* There's little loss of energy through leakage. There is no easing up under strain! Hele-Shaw hangs on like a bull pup.

This is *one* important reason why an increasing number of machine designers, builders, and buyers are specifying Hele-Shaw Fluid Power for presses and other ram type mechanisms.

But there are other advantages of equal importance. Hele-Shaw Fluid Power offers wide flexibility of location. It increases production by automatic change of speeds, pressures, or direction — instantaneously or gradually. Pumps, motors and transmissions are self-lubricating.

Write us for complete details. Ask us to show you how Hele-Shaw Fluid Power can be advantageously applied to the machinery you design, build, or buy. Specify Hele-Shaw.

A-E-CO Hele-Shaw FLUID POWER

OTHER A-E-CO PRODUCTS: Lo-Hed Hoists, Taylor Stoker Units, Marine Deck Auxiliaries.

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE, PHILADELPHIA, PA.

Government Pays $219,661 for Steel

WASHINGTON. — Government contracts awarded under the Walsh-Healey Act for the week ended Oct. 15 totaled $219,661.42 for iron and steel products and $286,642.83 for machinery, according to the Public Contracts Board.

The awards follow:

Elastic Stop Nut Corp., Elizabeth, N. J., nuts	$11,283.64
Sucs. Trujillo & Subina, S. en C., Ponce, P. R., barbed wire	20,426.24
Youngstown Sheet & Tube Co., Youngstown	
Maysteel Products, Inc., Mayville, Wis., bedside tables	26,250.00
Apollo Steel Co., Apollo, Pa., roofing	19,177.80
Truscon Steel Co., San Francisco, reinforcing steel	15,024.21
Judson Steel Corp., Oakland, Cal.,	
Rosslyn Steel & Cement Co., Washington, steel frame buildings	38,567.83
Chas. Glass & Son, Baltimore, hand tools	21,288.00
Standard Automotive Supply Co., Inc., Washington, hand tools	13,051.00
Latrobe Electric Steel Co., New York, steel, tool	54,592.70
Latrobe Electric Steel Co., Latrobe, Pa.	
Bethlehem Shipbuilding Corp., Ltd., New York, blading	120,528.83
Bethlehem Shipbuilding Corp., Ltd., Quincy, Mass.	
The American Tool Works Co., Cincinnati, drill, radial	10,716.00
The Watson-Stillman Co., Roselle, N. J., hydraulic press	19,200.00
Underwood Elliott Fisher Co., New York, office equipment	Indefinite
Remington Rand, Inc., Washington, office machines	Indefinite
International Postal Supply Co., Brooklyn, pick-up tables	14,400.00
The Austin-Western Road Machinery Co., Aurora, Ill., road rollers	33,011.00
LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, construction machinery, parts	Indefinite
Universal Crusher Co., Cedar Rapids, Iowa, construction machinery, parts	Indefinite
Warren Brothers Road Co., Cambridge, Mass., asphalt plants and replacements	39,670.00
New Home Sewing Machine Co., Rockford, Ill., sewing machines	15,496.00
The Chapman Valve Mfg. Co., Indian Orchard, Mass., steel valves	33,621.00

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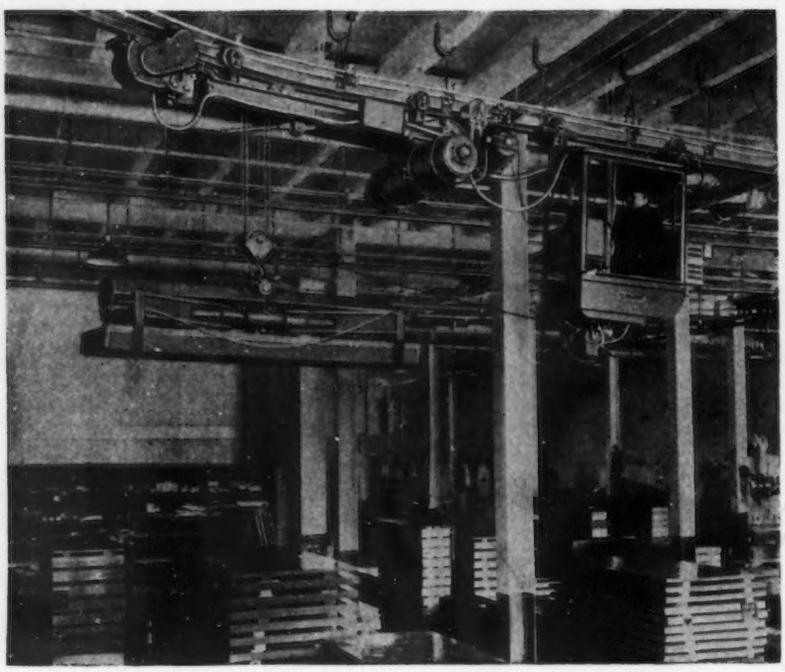
MATERIALS HANDLING EQUIPMENT

Serving Every Industry

from light loads in the food and textile plants to heavy loads in the metal working industries.



• A low headroom carrier with power to climb grades and a motor operated grab are features of this sheet steel handling installation. Some results have been reduction in aisle space, higher piles, more tonnage per square foot of floor area and one man control of storage operations.

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FTC Issues Complaint Against Material Dealers

WASHINGTON. — The Federal Trade Commission has issued a complaint against 11 Milwaukee building material dealers, charging unlawful restraint of trade and suppression of competition in the sale of supplies shipped outside the state.

The FTC alleged that the respondents specifically established and maintained minimum uniform prices and uniform terms and conditions; interfered with competitors in their efforts to purchase and obtain building supplies; and boycotted and threatened to boycott manufacturers and sellers. These practices, the commission charged, have the effect of substantially increasing and maintaining prices at which building supplies are sold within the state and of depriving purchasers and consumers of the benefits of fair, free and normal competition.

Carrier Air Conditioning Equipment at Fair

IN addition to depicting the history of air conditioning in its own exhibit, the Carrier Corp., Syracuse, N. Y., has contracted also to supply equipment to air condition the buildings of six exhibitors at the 1939 New York World's Fair. It is stated that Carrier machinery will provide cooling equal to that given off by the melting of more than a quarter of a million pounds of ice each day for the exhibit places of the Dupont, Ford Motor, Consolidated Edison and Borden Milk companies, and the French Government, Glass, Inc., and the Theatre and Concert Hall at the World's Fair. Cooling for the Dupont exhibit will be piped underground from the demonstration system in Carrier's five-story "Igloo of Tomorrow."

. . . PERSONALS . . .

J. N. WALKER, formerly general sales manager, Linde Air Products Co., has been elected vice-president of the Oxweld Acetylene Co. Both the Linde and Oxweld companies are units of the Union Carbide & Carbon Corp., New York. T. D. CARTLEDGE, formerly assistant general sales manager, succeeds Mr. Walker as general sales manager of the Linde Air Products Co.

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CARL L. LEAFE, who has been identified with the Norton Co., Worcester, Mass., for about 30 years, has been made superintendent of the Norton Co. of Canada, Ltd., Hamilton, Ont., succeeding ALBERT JOHNSON, who has been appointed consulting engineer for the Canadian plant. For the past few years Mr. Leafe has been superintendent in Worcester of the division which handles pulpstones, non-slip flooring materials, oilstones and a number of specialty products.

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W. I. HOWLAND, JR., for many years a sales executive and later vice-president in charge of Western sales, Carnegie-Illinois Steel Corp., will go to Milwaukee to become manager of sales for the organization there. Mr. Howland has been a member of the organization since 1908, when he began as an open-hearth helper after graduating from Yale.

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JOHN D. TEBBEN, formerly manager of the Detroit office of P. R. Mallory & Co., Inc., Indianapolis, Ind., has been appointed sales manager of the metallurgical division at Indianapolis.

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WARNER SEELY, secretary, Warner & Swasey Co., Cleveland, has been elected president of the Citizens League of Cleveland.

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W. F. BENDER has become associated with Ohio Steel Foundry Co., Springfield, Ohio, as sales representative in Pennsylvania and West Virginia, with headquarters at Pittsburgh.

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DEWITT H. GUNSOLUS has been appointed representative for the Furnace division, Continental Roll & Steel Foundry Co., with offices in Cincinnati. He will handle sales and engineering of industrial combustion equipment and allied furnace accessories.

WILLIAM C. SCHULTE, formerly metallurgist for the A. O. Smith Corp., Milwaukee, has been appointed assistant professor of mechanical engineering at Rutgers University, New Brunswick, N. J.

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JOHN KIRGAN, formerly associated with the Phillipsburg, N. J., plant of the Ingersoll-Rand Co., in charge of heat transfer engineering from 1917 to 1932 and water vapor refrigeration from 1932 to 1938, has been appointed New York manager of the Crane Packing Co., Chicago.

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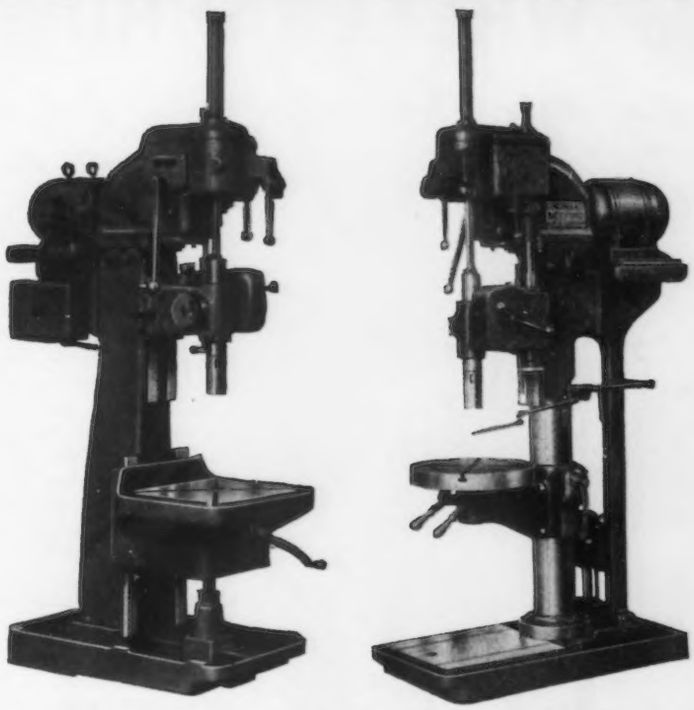
EDWARD C. HOENICKE, sales manager of the Eaton-Erb Foundry Co., Vassar, Mich., is to speak on "Permanent Mold Castings" at the Nov. 7 meeting of the Metropolitan New York-New Jersey chapter of the

All geared 21" 24" and 28"
SUPER SERVICE UPRIGHTS



More holes per dollar!

Greater productive capacity, adaptability, reliability, accuracy, convenience and economy available in Super Service Uprights assure "More Holes per Dollar."

Cincinnati Bickford invites the most searching comparison of these modern machines with other drilling machines. We are confident your analysis will convince you that Super Service Uprights offer maximum return in production per dollar of investment. The Cincinnati Bickford Tool Co., Oakley, Cincinnati, Ohio, U.S.A.

CINCINNATI BICKFORD

American Foundrymen's Association, at the Essex House, Newark, N. J.

❖ ❖ ❖

JOSEPH A. MOSKOWITZ, of Samuel Sons Iron & Steel Co., Inc., Brooklyn, has been reelected president of the New York chapter of the Institute of Scrap Iron and Steel. HERBERT LURIA, third, of Luria Brothers & Co., has been elected first vice-president; ALBERT SEITZMAN, of Borough Metal & Scrap Iron Co., second vice-president, and GEORGE BETTEN, of S. Betten, Inc., New York, third vice-president. A. SCHIFFMAN, of Scrap Iron Baling Corp., has been reelected secretary and Morris Machlin, of Machlin Brothers, Inc., has been reelected treasurer.

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GEORGE ROBINSON, formerly of Patriarche & Bell, New York, has organized a steel warehouse under the name of Specialty Steel Co., 149 Water Street, New York. The company will handle high carbon and alloy spring steels.

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CHARLES H. HUGHES, for many years research engineer and designer for the Semet-Solvay Engineering Corp., has resigned to establish a consulting engineering service at 270 Broadway, New York.

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JOSEPH WORLEY has been made purchasing agent of the Emerson Electric Mfg. Co., St. Louis, Mo.

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LEE M. CLEGG, executive vice-president of the Thompson Products Co., Cleveland, and DR. ZAY JEFFRIES, president of the Carboloy Co., Detroit, have been elected members of the Corporation and the Board of Trustees of Case School of Applied Science, Cleveland.

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PAUL TEAS, Paul Teas, Inc., Cleveland, has been elected new president of the Industrial Marketers of Cleveland, succeeding STANLEY A. KNISELY, Republic Steel Corp., recently elected president of the National Industrial Advertisers Association, Inc.

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J. L. BELTZ, advertising manager, Thew Shovel Co., Lorain, Ohio, has been elected vice-president of the Industrial Marketers of Cleveland.

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L. S. HAMAKER, vice-president, Berger Mfg. Co., division of Republic Steel Corp., has been elected president of the Canton, Ohio, Chamber of Commerce.

Enameled Steel Curbing Developed at Pittsburgh

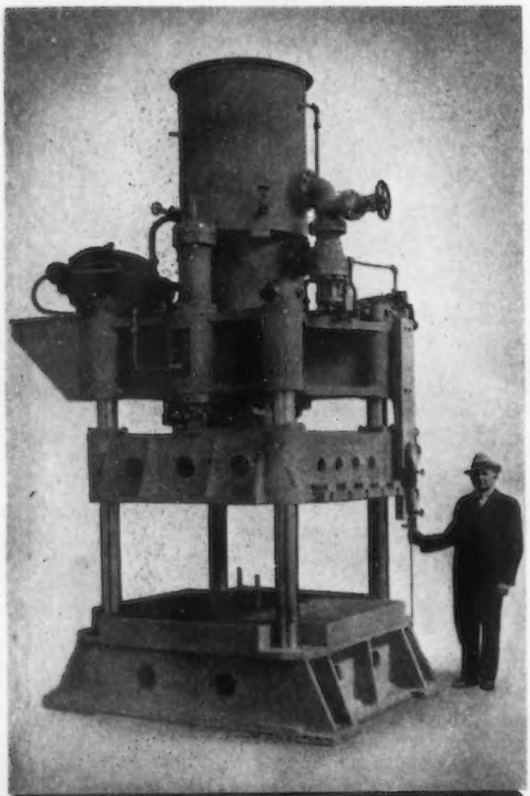
STEEL, enameling and construction company officials have cooperated with Allegheny County engineers, Pittsburgh, in developing a new type of curbing for roadway construction.

This curbing, recently tested and installed in Pittsburgh's Liberty Tubes, is made from 11-gage enameling steel, manufactured by Carnegie - Illinois Steel Corp., fabricated and enameled by Ingram-Richardson Mfg. Co., and installed by George Vang Co., general contractors.

The permanent whiteness and corrosion-resisting properties of enameled steel, as demonstrated by exhaustive tests of county engineers, were influencing factors leading to its use for this new and easily visible curbing. The vertical leg of the curb is attached to a steel curb angle by brass bolts, and the horizontal leg is secured by an imbedded alloy steel bolt.

From AIRPLANES to WHEELBARROWS

"You Can Make Them Better On a Lake Erie Hydraulic Press"



Your product doesn't need a "three point landing gear" to profit by the economies of Lake Erie Hydraulic Presses. However, two recent installations of this 400 Ton Press—one for making airplane parts, and one for making wheelbarrows, are convincing evidence of the versatility of Lake Erie Hydraulic Presses for forming an unlimited variety of parts. (Another new application of this same model was for forming heavy metal guards for streamlined machine tools.)

The use of dies made of wood, cast iron or other low cost materials . . . quick changeover and simplified die setting saves time and cuts scrap losses . . . accurate, uniform parts eliminate slow hand fitting and reduce assembly costs — those are some of the unexpected and important savings.

The diversified experience of Lake Erie engineers may be able to help you. Write, giving your requirements.

This 400 Ton Hydraulic Press shown at left is just one of the complete Lake Erie Line.

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LAKE ERIE ENGINEERING CORP.

68-H Kenmore Station, Buffalo, N. Y.

. . . OBITUARY . . .

GUSTAVE E. FALLEEN, president and founder of the Falleen Drop Forge Corp., Manistee, Mich., died recently. Mr. Falleen was born in Warmland, Sweden, Jan. 13. 1867. He came to this country at the age of 19 and started his apprenticeship in the drop forge industry in Chicago. In 1906 he became associated with Thomas B. Jeffrey, and was in charge of the building and operation of the forge shop of the Jeffrey Motor Co., which later became the Nash Motor Co. In 1911 he moved to Rockford, Ill., and was in charge of the building of a similar plant for the Rockford Drop Forge Co., and remained there as general manager until 1924, when he moved to Manistee and purchased the plant of the Manistee Drop Forge Co. and organized the Falleen Drop Forge Corp.

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CHARLES W. PAESCHKE, president of the Geuder, Paeschke & Frey Co., Milwaukee, manufacturer of stamped steel merchandise, died on Oct. 19. aged 55 years. He had been ill only a short time with pneumonia. Mr. Paeschke was the son of the late Charles A. Paeschke, co-founder of the firm in 1880, who died in 1936. His son, August K. Paeschke, is secretary of the company.

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KARL W. NELSON, sales manager of the plastics department of the General Electric Co., and formerly manager of the company's automotive products sales section, died suddenly in Pittsfield, Mass., on Oct. 16, aged 35 years.

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OSCAR J. LINGEMAN, who, until his retirement two years ago, had been vice-president and general manager of the Aetna Portland Cement Co. in Detroit for 25 years, was buried Oct. 18. Mr. Lingeman, who was 58 years old, had lived in Pasadena, Cal., since his retirement.

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FREDERICK S. PHELPS, general superintendent of the Pacific works of Columbia Steel Co., San Francisco, died at Portland, Ore., on Oct. 17 while on a business trip. He was 55 years old. He had been identified with the United States Steel Corp. subsidiaries for 32 years. He joined the American Steel & Wire Co., Worcester, Mass., works in 1906 after graduation from Massachusetts Institute of Technology and two years later was made assistant superintendent of the wire rope mill. He was transferred in a like capacity to the Pacific works of the wire company in 1910, and five years later was made superintendent. After the acquisition of Columbia Steel Co. by United States Steel Corp. in 1930, Mr. Phelps was made general superintendent.

CHARLES R. THIEL, machine designer and inventor, died in North Andover, Mass., Oct. 1. He was associated with the Davis Furbush Machine Co. for 40 years. Mr. Thiel was

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WILLIAM E. KELLY, Cleveland inventor and founder of the Kelly Reamer Co., died Oct. 7 in Cleveland. Mr. Kelly became nationally known in the late 1890's after he invented a divided

NORTHERN HI-LIFT HOISTS

★ Increase plant head-room

★ Handle bulkier loads

★ Have longer useful life

★ Increase lifting power

★ Reduce handling costs

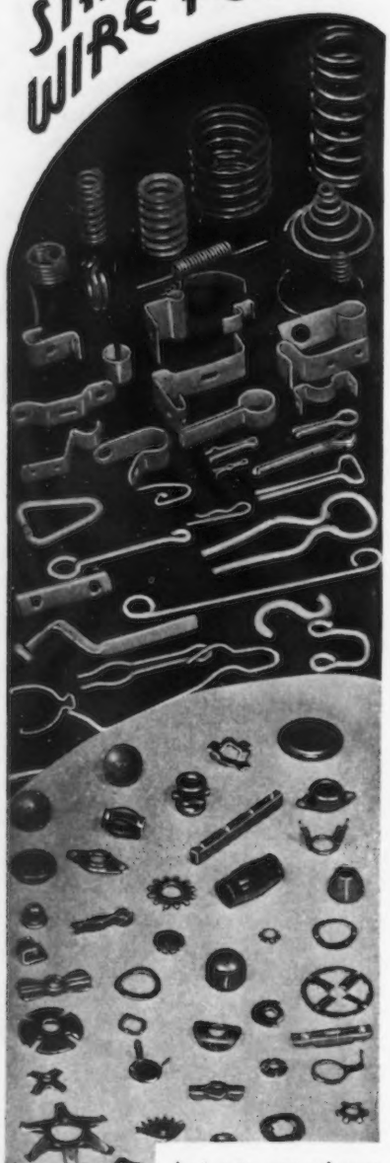
★ Cut maintenance

★ Provide greater flexibility in handling

NORTHERN ENGINEERING WORKS *Detroit, Michigan*

CRANES *Northern* HOISTS

SPRINGS
STAMPINGS
WIRE FORMS



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Ask for our stock lists on Washers, Cotters, and Expansion Plugs.

M·D·Hubbard Spring Company

M. D. HUBBARD, Pres. P. M. HUBBARD J. A. HUBBARD, Sec'y

1905 1938

750 Central Ave., Pontiac, Mich.

handlebar for bicycles with teeth in the joint to permit adjustment.

❖ ❖ ❖

THOMAS P. AGNEW, general manager, Bowler Foundry Co., Cleveland, died Oct. 13, aged 57 years. He had been an executive of the company for 25 years.

❖ ❖ ❖

WILLIAM E. WALTON, retired superintendent of Dangler division of American Stove Co., Cleveland, died in Cleveland, Oct. 13, aged 76 years.

Wickwire-Spencer Lifts Pay for 2000

WICKWIRE - SPENCER STEEL CO., effective Oct. 31, will advance wages of 2000 employees in company plants at Worcester and Palmer, Mass., and Trenton, N. J., by 12.5 per cent.

Railroad's Credit Record Good, C. R. Gray Says

THE credit of railroads and their record for prompt repayment of more than a billion dollars, which was loaned to them through their period of rehabilitation after the World War, justifies the extension of credit by the Reconstruction Finance Corp. to bring the transportation lines through their present difficulties, C. R. Gray, vice-president of the board of the Union Pacific Railroad, declared at a meeting of the Economic Club of Detroit, Oct. 17, asserting that railroads, unlike other businesses, cannot close up during depression periods. Mr. Gray, who was a member of President Roosevelt's committee to suggest corrective laws for the preservation of the carriers, said that loans should be forthcoming for maintenance of roadway and equipment upon very easy terms. ICC regulations have prevented them from creating surpluses in boom years to carry them through the depression, he said.

Germany Paying Britain $20 a Ton for Scrap

LONDON (*By Mail*).—British scrap exports to Germany have recently undergone a substantial increase. At the present moment about 2000 tons per week is being sold to that country.

Shipping circles interested in transporting the metal are asking why it is being allowed to go abroad at a time of political tension. The answer is that Britain has gained control of the scrap market and is able to sell at her own price. Germany is having to pay up to £4 ($20) per ton for her requirements.

Most of this scrap has been bought in the United States by British interests, and a good deal of it is being re-sold to Continental buyers at higher prices.

The general opinion in Britain is to distrust the increase in scrap buying by Germany. Coming immediately after Germany's declarations of her desire for peace, this frantic rush for scrap is not reassuring.

Both Germany and Italy have lately been outbidding British shipbreakers in order to get old ships for scrapping. They are having to pay prices unknown a couple of years ago.

Third Quarter Better For Steel Producers

SEVERAL steel companies this week reported third quarter profits or losses smaller than the deficits incurred in the second quarter. Among the companies reporting were:

	3d quar.	2d quar.	3d quar. 1937
Sharon Steel Corp.	$19,065	$192,006	$498,569*
Continental Steel Corp.	192,360*	156,091*	258,890*
Superior Steel Corp.	49,994	121,290	103,492*
Detroit Steel Corp.	24,582*	2,733	164,381*
Pittsburgh Coke & Iron Co.	36,389*	47,838*	277,968*
Interlake Iron Corp.	452,081	294,587	838,371*
Truscon Steel Co.	280,993	....	231,904*
Keystone Steel & Wire Co.	83,224*	....	203,693
Midland Steel Products Corp.	37,263*	162,815*	351,249

* Net profit.

Browning Crane & Shovel Co., 16226 Waterloo Road, N.E., Cleveland, has appointed Farmers Implement Co., Chehalis, Wash., as its representative in the northern Pacific Coast area.

Ferracute Machine Co., of Bridgeton, N. J., have opened an export department at 44 Whitehall Street, New York, which will handle the line of power presses manufactured by the company for certain important foreign countries. Stanley H. Rose is export manager in charge of foreign sales.

Tiffany Electric Co. has moved its offices from its plant at 131-143 Howell Street, Jersey City, N. J., to 28 Concourse, East, Jersey City. Plant remains at the Howell Street address.

National Steel Car Co., Kenilworth Avenue, Hamilton, Ont., plans one-story addition, 150 x 200 ft., and will carry out erection with day labor. Cost over $100,000 with equipment.

F. M. Farmer Again Heads Engineering Foundation

ELECTION of officers of the Engineering Foundation, research organization of the major engineering societies, resulted in the reelection of Frank Malcolm Farmer, vice-president and chief engineer of the Electrical Testing Laboratories, New York. Mr. Farmer, who enters upon his third term, is an authority on electrical measurements, electrical insulating materials, testing of engineering materials, and high voltage cables.

George E. Beggs, professor of civil engineering, Princeton University, was elected vice-chairman. J. H. R. Arms will continue as secretary and Otis E. Hovey as director. The executive committee, headed by Mr. Farmer, includes Professor Beggs, A. L. J. Queneau, metallurgist, United States Steel Corp., New York; Prof. W. I Slichter of Columbia University, and Kenneth H. Condit, National Industrial Conference Board, New York.

Cleveland Firm to Build Forge Shop

CONTRACT has been awarded the H. K. Ferguson Co., Cleveland, by the Columbus Auto Parts, Columbus, Ohio, for design and construction of a forge shop, 160 by 220 ft., steel frame, steel sash, corrugated asbestos roofing, and concrete floors. A 5-ton electrically operated crane will be installed. Cost, complete with equipment, is about $225,000. R. E. Klages is president.

Bright Nickel Corp. Organized at Detroit

DETROIT. — Announcement was made here this week of formation of the Bright Nickel Corp., which has purchased the American and Canadian patents for the bright nickel process formerly owned by the Schloetter Process Corp., of New York. It has also purchased the patents and patent applications owned by the Pyrene Mfg. Co., of Newark, N. J., and the Parker-Wolverine Co., of Detroit.

The officers and directors of the new company are as follows: Charles H. Awkerman, of Detroit, president: Richard G. Auspitzer, Schloetter Process Corp., vice-president; Luis E. Eckelmann, Pyrene Mfg. Co., vice-president; W. M. Hawkins, Parker-Wolverine Co., Detroit, secretary-treasurer; and John Scofield.

What is it costing you NOT TO USE MODERN WARNER & SWASEYS?

In these days of higher costs and low profit margins, no company can afford a single operation the cost of which could possibly be reduced.

In hundreds of plants, in almost every industry, new Warner & Swaseys are doing this sort of thing:

Machining job — reduced cost from 64¢ each to 10¢.

Spray gun part — former cost 6¢ each with 60¢ labor, now 2¢ each with 75¢ labor.

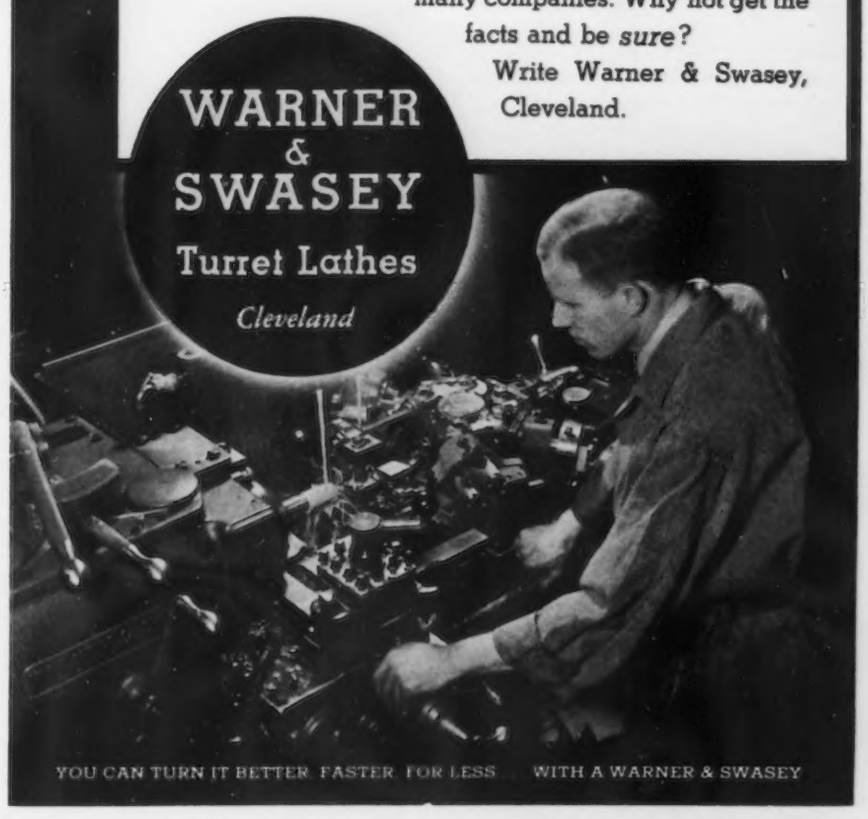
Valve stems — formerly required 85 minutes, now done in 12½.

Bolt job — even in small lots reduced time from 60 minutes to 8 minutes.

Parts maker — had made 1 unit in 15 minutes with 40% scrap loss; now makes 1 unit in 5 minutes with 1% scrap loss.

Trained Warner & Swasey field engineers will be glad to survey your plant, without any cost or obligation, and tell you whether or not similar savings could be made in your turning operations. These surveys have saved thousands of dollars for many companies. Why not get the facts and be *sure*?

Write Warner & Swasey, Cleveland.



. . . THE NEWS IN BRIEF . . .

40,000 celebrate continuous mill anniversary at Ashland.—**Page 51.**

Automobile production gains one-third in a week. . . . Output of 3,500,000 cars or more now predicted for calendar year.—**Page 53.**

Industry Speaks — Industry Listens. —**Page 55.**

Majority of employers cooperate in enforcement of Fair Labor Standards Act, Wage-Hour Administrator E. F. Andrews reports.—**Page 58.**

Express highways are needed by U. S. motorists, V. G. Iden, of the American Institute of Steel Construction, says.—**Page 60.**

Supreme Court denies petition asking ruling on Robinson-Patman anti-price discrimination law.—**Page 61.**

NLRB certifies Amalgamated Association of Iron, Steel and Tin Workers as bargaining agent for Ingram-Richardson Mfg. Co., Frankfort, Ind.—**Page 61.**

Federal Trade Commission issues complaint against 11 Milwaukee building material dealers, charging suppression of competition.—**Page 62.**

Carrier air conditioning equipment at the 1939 New York World's Fair. —**Page 62.**

Government's weekly awards for iron and steel products total $219,661, machinery awards, $286,642. —**Page 62.**

Wickwire Spencer lifts pay for 2000. —**Page 66.**

Germany paying Britain $20 a ton for scrap.—**Page 66.**

Six iron and steel companies report profits or losses during third quarter below deficits of second quarter.—**Page 66.**

Credit showing of the nation's railroads following the World War justifies loans to carriers by Reconstruction Finance Corp., C. R. Gray finds.—**Page 66.**

Cleveland firm to build new $225,000 forge shop for Columbus Auto Parts, Columbus, Ohio.—**Page 67.**

Bright Metal Corp. organized at Detroit buys process and patents formerly owned by Newark and Detroit companies.—**Page 67.**

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MEETINGS

Nov. 14—Society of Automotive Engineers, annual dinner, New York.

Nov. 16 and 17—Purchasing Agents' Association, Chicago.

Nov. 16 and 17—Porcelain Enamel Institute, Cleveland.

Nov. 25 and 26—American Foundrymen's Association, Purdue University, Lafayette, Ind.

Dec. 5 to 10—National Exposition of Power and Mechanical Engineering, New York.

F. M. Farmer, vice-president of Electrical Testing Laboratories, again is elected president of the Engineering Foundation.—**Page 67.**

Navy Department will open bids for 170 tons of nickel bars for Boston Navy yard on Nov. 1, and bar and strip steel bids Nov. 4.—**Page 68.**

Republic Steel Corp. appeals adverse Labor Board decision demanding rehiring of 5000, hits order to reimburse Government for relief costs.—**Page 70.**

Illinois Manufacturers' Association plans meetings for Nov. 11, Nov. 18 and Feb. 17, hears talks on Wage-Hour Law and Wagner Act.—**Page 71.**

Restoration of the former plan of pricing steel products, particularly for flat sheets and roofing products, is urged by National Association of Sheet Metal Distributers.—**Page 72.**

John Fritz gold medal, annually awarded for notable scientific or industrial achievement, goes to Dr. F. B. Jewett, vice-president, American Telephone & Telegraph Co.—**Page 72.**

Youngstown Sheet & Tube Co. reports third quarter loss of $727,546 against $118,033 profit in second quarter of 1938, $3,586,495 profit in third quarter of 1937.—**Page 73.**

United States Steel Corp. reports third quarter loss.—**Page 73.**

Ruling on minimum steel wage still up for study by the Walsh-Healey Public Contracts Board. — **Page 75.**

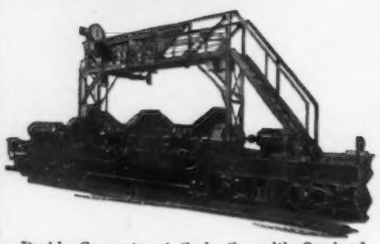
Ohio State University announces new curriculum leading to a degree in welding engineering.—**Page 90.**

Domestic machine tool orders showing a spotty improvement throughout country.—**Page 90.**

Two views of the Double Carry-over Cooling Bed. This bed receives the bars from the Finishing Train and Dividing Shears, and passes them on to the Bar Shears. Notice that the bars lie straight and are even at the ends. In the background is seen the Chain Coil Conveyor, automatic "Take-off," and Coil Hook Carrier. MORGAN CONSTRUCTION COMPANY, Worcester, Massachusetts.

R47

ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas-Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.
Engineers - Manufacturers
1140 Ivanhoe Rd., Cleveland, O.

Republic Appeals Adverse NLRB Ruling to U. S. Court

CLEVELAND.—Republic Steel Corp. has filed with the United States Circuit Court of Appeals in Philadelphia a petition to review and set aside the new order of the National Labor Relations Board in the Republic case, issued Oct. 19.

The board's order, virtually a duplicate of the decision it handed down April 6 but canceled in June after Republic attacked its legality, ordered the company to reinstate 5000 workers who went on strike in May, 1937, and to disestablish alleged company unions and to cease "interference" with the Steel Workers Organizing Committee and the Amalgamated Association of Iron, Steel & Tin Workers.

In its appeal, Republic asserts that the entire order of the board is contrary to the evidence, is illegal and void and denies the company and its employees their constitutional rights of due process of law, freedom of contract and freedom of speech.

In commenting upon the board's new order, J. A. Voss, Republic Director of Industrial Relations, said: "Under the order employees who went out on strike in 1937 were not awarded back pay for the time elapsed since the strike. Also the board holds again that the company's refusal to sign a contract with S.W.O.C. is not an unfair labor practice. This is a complete justification for the stand taken by the company in the spring of 1937.

Board's Decision Wrong

"With respect to reinstating former employees who went on strike, the company's policy all along has been to reinstate these men except those guilty of violence or illegal acts, as work became available.

"We are convinced the board's decision is wrong in holding that the company must not negotiate with its employees who have formed their own independent labor organizations. They exist today as collective bargaining organizations, representing a major part of the company's employees, and should have as much right to act in that capacity as has any other labor group. The courts will have to decide this question."

The company in its petition claims that when the board withdrew its original order dated April 8, 1938, the case was closed and the board has no jurisdiction to re-open the case.

The new order, according to the company's petition, is based on a pretended hearing held Aug. 11, prior to which the labor board "made up its mind and reached a conclusion without affording the company a hearing as to charges against it." That procedure, it is claimed, denies the company due process of the law in violation of the Constitution of the United States.

Ordered WPA Payments

Among the other important points upon which the company bases its petition for review and setting aside the board's order are the following:

1. The order of the board depriving the company of the privilege of meeting with its own employees and discussing with them matters relating to employment conditions is attacked. Also the order of the board denying the right of company officials publicly to express their views on labor matters to employees is declared to be an abridgment of freedom of speech.

2. The company attacks the portion of the board's order directing it to pay over to WPA and similar agencies any amounts which may be paid by such agencies to strikers in the event reinstatement is refused them. The company contends that this is a new principle established by the board, that it is contrary to law and has no relation to the question of effectuating the policies of the National Labor Relations Act.

3. Complaint is made in the petition that the National Labor Relations Board has persistently refused the request of the company to disclose whether members of the board actually read the record of the case and made the decision themselves, or whether study of the case and preparation of the findings and order were left to subordinates of the board. That practice, the company points out, has been held illegal by the United States Supreme Court.

4. The petition attacks the board for instructing the company to hire many employees who were guilty of violence and other law infractions during the steel strike. Among the offenses committed by men whom the company is ordered to re-hire are assault and battery, rioting, carrying concealed weapons, interfering with and obstructing railway tracks, and malicious destruction of property. Specific objection is made to the fact that the board instructs the company to re-hire nine men who entered pleas of guilty in the

Federal Court for the offense of impeding United States mail.

Many additional objections to the board's order are contained in the petition.

At Washington it was said that in the NLRB decision against the Republic Steel was a projected principle which was taken to set up a sweeping precedent under which the New Deal apparently proposes that industry shall be made to finance Government relief costs paid to strikers.

This innovation being tried out on steel was seen in that portion of the order which commanded Republic in paying remedial wages to strikers who are not reinstated, to deduct wages earned on Government work relief projects and pay it over to the agency supplying the funds.

Opinion has been expressed that the legality of this attempt at unauthorized taxation will be sharply challenged in the courts.

Illinois Industry Plans Meeting Nov. 18

THE southern division of the Illinois Manufacturers' Association held the first of a series of four meetings, Oct. 21, at the Missouri Athletic Association, St. Louis, which was addressed by David R. Clarke, general counsel for the Illinois Manufacturers' Association. Mr. Clarke discussed "Practical Problems Confronting Business Under Federal Fair Labor Standards Act" and "The Wagner Labor Relations Act."

The Nov. 18 meeting will be held at Hotel Belleville, Belleville, Ill. Mr. C. S. Craigmile of the Belden Mfg. Co. of Chicago, will talk on "Management and Foremen Training."

Mr. William Odom of William Odom Associates, Chicago, will also speak at the Nov. 18 meeting on "Living With Unemployment Compensation Laws." Mr. Odom collaborated with others in preparing the Wisconsin Act, which was the first unemployment compensation act enacted.

"Looking Ahead Into 1939" will be the general theme of the Jan. 20 meeting, which will be held at the Broadview Hotel, East St. Louis, Ill. Dr. Isaac Lippincott, Professor of Economic Resources of the Washington University, St. Louis, will speak on "What's Ahead for American Business."

Chester Creider, secretary of Butler Bros., Chicago, will have for his subject, "What Are We Going to Do About Human Relations in Business."

The subject and speakers for the fourth meeting to be held on Feb. 17 at the Missouri Athletic Association, St. Louis, will be announced later.

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Sheet Metal Association Urges Old Basing Points Be Restored

MEMBERS of the National Association of Sheet Metal Distributers, meeting last week at Atlantic City, urged restoration of the former plan of pricing steel products.

The association approved recommendations of its Galvanized and Black Sheet and Corrugated Roofing Committee urging elimination of new basing points and "reestablishment of the old basing points, namely, Pittsburgh, Gary and Birmingham, in so far as flat sheets and roofing are concerned."

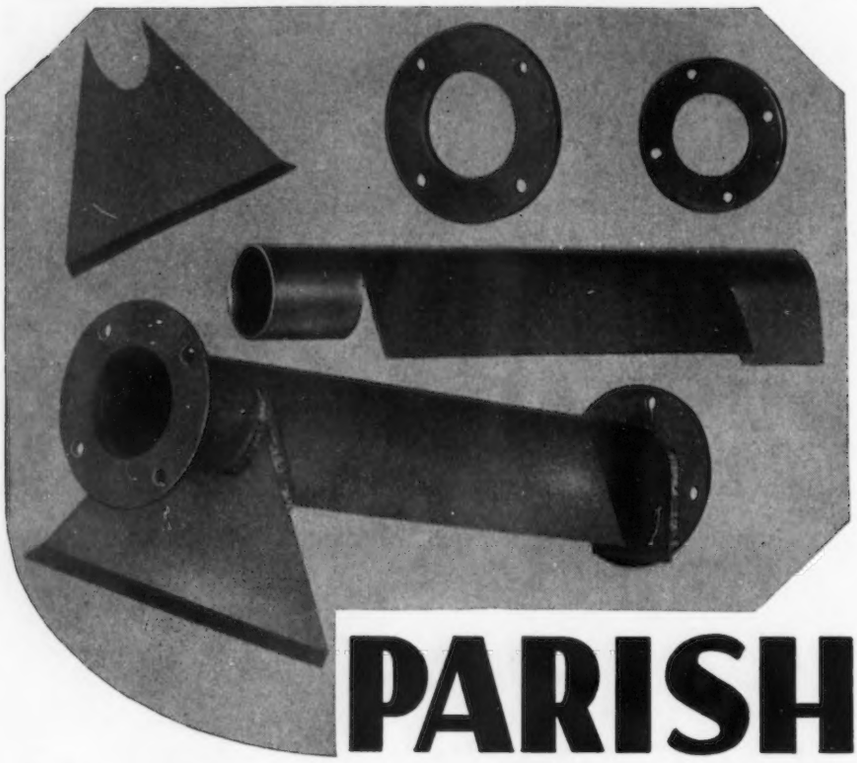
Read by A. J. Becker, Ohio Valley Hardware & Roofing Co., Evansville, Ind., the committee's report also recommended careful study of the jobbers' list for elimination of firms not entitled to the jobbers' differential.

Meanwhile manufacturers of asphalt and roll roofing were urged, in a report to the Sheet Metal Distributers by Joseph Stelwagon, Stelwagon Mfg. Co., Philadelphia, to adopt price plans similar to that used in the steel industry, with prices established on a quarterly basis.

Norman W. Foy, general manager of sales, Republic Steel Corp., told the association that a more equitable relationship between production costs and prices must be reached. He drew a comparison of the upswing in wages, taxes and other elements of cost in the steel industry with steel prices. This situation, he said, has "spelled heavy losses for much of the industry this year" and cannot be converted into profits even with the present increasing volume.

Additional capital is needed to keep plants up to date and provide funds for research although the average steel company has earned only 1.5 per cent yearly on its investment in the years since 1930, the Republic sales executive said.

"We, the producers, and you the distributers," said Mr. Foy, "are essential to each other. We want to see you successful and doing all the business which you might reasonably expect to do. I would like to stress at this point the fact that Republic has always and does now lean heavily on its jobbers as an outlet for its products. We feel that there is a reasonably sharp line beyond which Republic salesmen should not go in the solicitation of business, on the one hand, and beyond which the distributer salesman should not go, on the other."



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John Fritz Medal Awarded To Dr. Frank B. Jewett

DR. FRANK BALDWIN JEWETT, vice-president, American Telephone & Telegraph Co., and president of the Bell Telephone Laboratories, has been awarded the 1939 John Fritz Gold Medal, highest of American engineering honors, for "vision and leadership in science, and for notable achievement in the furtherance of industrial research and development in communication."

The award is made annually for notable scientific or industrial achievement by a board composed of representatives of the four national engineering societies of civil, mining and metallurgical, mechanical, and electrical engineers.

U. S. Steel Reports Loss of $5,847,791

UNITED STATES STEEL CORP. this week reported for the quarter ended Sept. 30, 1938, a net loss of $5,847,791 after all charges, compared with $5,010,426 loss in the second quarter and a loss of $1,292,-151 in the first quarter of this year.

The Corporation declared the regular quarterly dividend on preferred stock, and reported that the increased demand for steel products which developed about the middle of July has since shown further improvement.

Shipments of finished steel products for the quarter ended Sept. 30, 1938, totaled 1,577,870 tons, and for the first nine months of this year, 4,588,224 tons.

Following the board of directors meeting the Corporation reported that third quarter operations this year averaged 34.6 per cent, while production during the first weeks in October averaged better than 43 per cent of capacity.

U. S. Steel reported its nine months' payroll as $202,488,466, compared with $354,217,827 in the corresponding period of 1937, a decrease of 42.8 per cent. The corporation said: "While recent employment statistics have shown no material change in total number of employees on the payroll, the gradual improvement in operating rates is permitting more satisfactory employment to larger numbers of our workers."

Three Companies Report Heavy Losses

JONES & LAUGHLIN STEEL CORP. and subsidiary companies report, for the quarter ended Sept. 30, 1938, a net loss of $1,958,810, compared with a net loss of $1,654,303 for the quarter ended June 30, and loss of $1,269,725 for the quarter ended March 31.

❖ ❖ ❖

REPUBLIC STEEL CORP. net loss in the third quarter after all charges amounted to $2,387,556, compared with a net loss in the second quarter of $2,856,317 and for first quarter $3,062,564.

❖ ❖ ❖

Youngstown Sheet & Tube Co. reports for the third quarter of 1938 a net loss of $727,546, compared with a net profit of $118,033 in the second quarter of 1938 and a net profit of $3,-586,495 in the third three month period of last year.

Steel Imports Show Sharp Rise

WASHINGTON. — Imports of iron and steel products excluding scrap in September, 1938, totaled 23,740 gross tons valued at $1,332,092, compared with 18,404 tons in August valued at $1,182,740 and 28,505 tons in September, 1937, valued at $1,980,-640.

Harbison-Walker Refractories Co., Pittsburgh, and subsidiaries, report net earnings of $154,700 for quarter ended Sept. 30, equal to 8c. per share on common stock outstanding. This compares with net of $87,100 or 3c. per share in the June quarter and net of $782,100 or 54c. per share in the third quarter of 1937. For nine months ended Sept. 30, net was $384,300, equal to 18c. per share, compared with $2,795,300 or $1.95 per share in the corresponding 1937 period. For 12 months ended Sept. 30, net earnings were $720,600, equal to 40c. per share, as against $3,826,100 net or $2.68 on the common, in the preceding 12 months.

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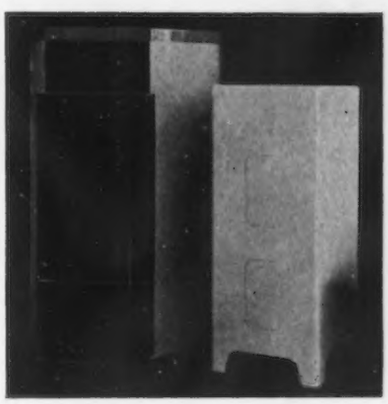

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Steel Slightly Affected By Federal Wage-Hour Measure

WASHINGTON. — Wage, salary, and hour conditions in the nation's steel industry will be affected but slightly by the Federal Wage and Hour Law which went into operation this week. Steel wage earners for some time have worked no more than 40 hours with a provision for time and a half for overtime in excess of this figure. The Law reckons overtime on a weekly rather than daily basis, with no carryover from week to week. In most cases white collar workers have been on a work schedule amounting roughly to 44 hours a week or less. Since the initial phase of the new Federal law puts the ceiling at 44 hr. a week, neither of these two groups will be affected to any extent. The wage provision in the legislation calling for a minimum of 25c. an hr. is somewhat below the lowest wage paid in the steel industry.

Exemptions in the steel industry under the Wage and Hour Bill are expected to be very few, and will involve only executives, administrators, strictly professional workers, secretaries, and salesmen.

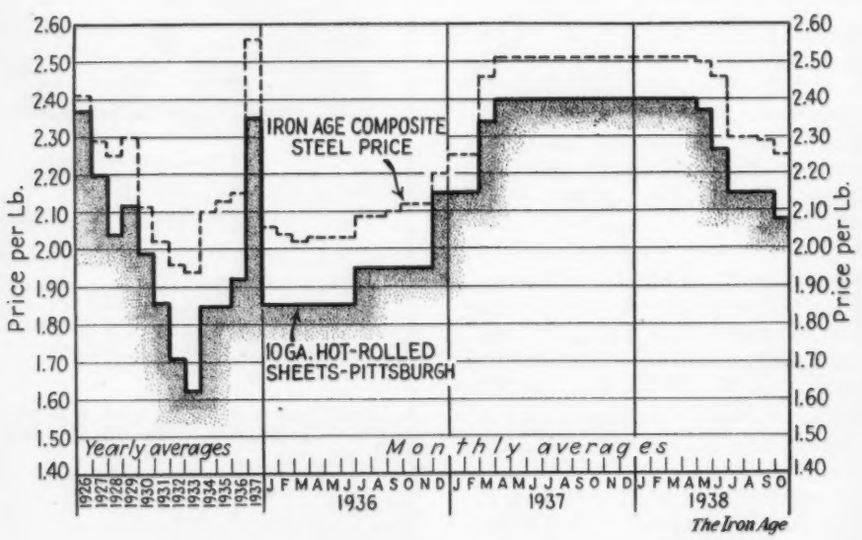
Some Foremen Exempt

In the case of executives and administrators to be exempted, the employee must earn not less than $30 a week, must manage or regularly direct the work of other employees in a department and must have the prerogative of either hiring or firing employees or making recommendations along these lines. Working foremen or those bosses who spend considerable time doing the same type of work as employees they are supervising, are not expected to be exempt under the new law.

Professional workers including research, metallurgical, and chemical who are involved in non-routine work,

Hot Rolled Sheets Dropped to Lowest Point Since 1936

THE weakness in prices of flat-rolled products in the weeks of Oct. 11 and 18, which brought quotations on hot-rolled sheets down to a low of 1.85c., base, in the latter week, gives an average price on hot-rolled sheets of 1.98c. for the first three weeks of the current month. When compared to past average monthly prices on this product it is the lowest since November, 1936. The return of sheet quotations to 2.15c. in the past week will give an average of 2.02c. for the entire month, which will still be the lowest monthly average since November, 1936. The steel composite price in the first three weeks of October averages 2.25c., or the lowest monthly average since February, 1937.



are expected to be exempt but any employees in these groups who performs work of a routine or normal nature will come under the legislation's provisions. Outside salesmen and secretaries are also expected to be exempt.

On the whole, few exemptions are expected to be made in the steel industry and despite the possibilities of higher steel operations, overtime work will be kept to a minimum in line with the spirit behind the Federal law. A considerable increase in the steel industry's bookkeeping work because of the wage and hour act is anticipated.

Steel Wage Ruling Still Before Contracts Board

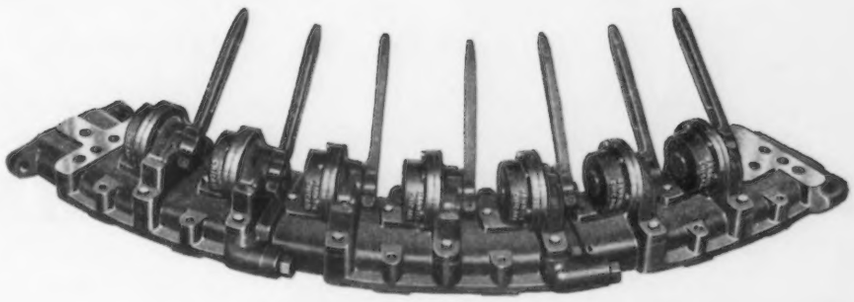
WASHINGTON.—The Public Contracts Board's long-delayed recommendations for minimum wages in the steel industry were being studied by Administrator Walling and the Labor Department solicitor this week preliminary to submitting the proposals to the Secretary of Labor. Presumably, the question which continues to delay further action is the problem of whether to permit wage differentials based on size of plants.

Also being raised is the question of whether the board's recommendations will be made public before being approved by the Secretary of Labor. This power is discretionary and the policy of making the proposals public prior to approval has been followed in about 50 per cent of the wage cases under the Walsh-Healey Public Contracts Act.

SWOC Plea at Detroit Plant Is Dismissed by Labor Board

WASHINGTON.—The National Labor Relations Board on Monday announced dismissal of a certification petition filed by Local 1279, Steel Workers Organizing Committee (CIO) on behalf of workers at the R. C. Mahon Co., Detroit, following a secret ballot election on Feb. 25, which gave the SWOC 161 votes to 7 for the International Association of Bridge, Structural, and Ornamental Iron Workers, Local 508 (AFL), and 227 for neither labor organization.

On March 2, the SWOC filed objections to the election contending the company had engaged in unfair labor practices regarding the conducting of the election. The Regional Director certified the poll was fairly conducted, and that the ballots cast were duly counted under his supervision. He reported that he had, at various times, failed to secure any evidence from Local 1279 in support of its objections.



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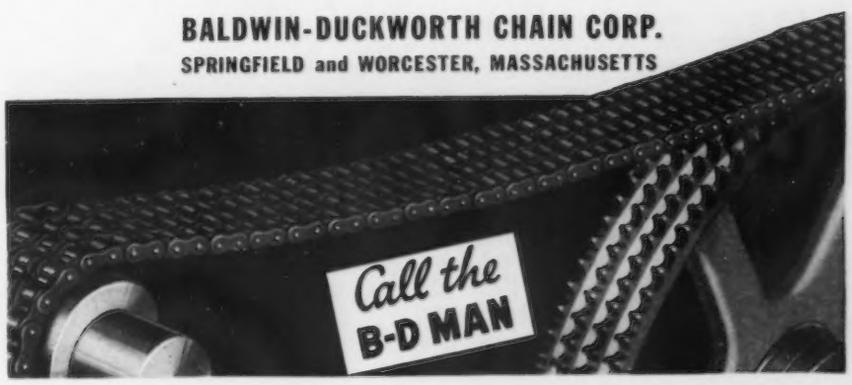


. . . SUMMARY OF THE WEEK . . .

. . . Lifting of sheet and strip prices brings heavy bookings.

o o o

. . . Ingot production higher and is expected to advance further.

o o o

. . . Steel scrap up $1 at Cleveland; pig iron shipments gaining.

WITHDRAWAL of $6 a ton concessions on sheets and strip last week was accompanied by the placing of heavy commitments for these products at the low prices. The buying movement was reminiscent of the flurries which occurred in late 1936 and in the early months of 1937 preceding price advances.

If all of the flat rolled products for which mills are committed are specified, as undoubtedly they will be, a sharp bulge in operations is to be expected during November and December, as mills will insist on the completion of shipments by Dec. 31. Most mills attempted to obtain definite rolling specifications with the low-priced orders, but this was not possible in all instances, and these will come along later. Blanket coverages were obtained by some buyers, but there was an avoidance by mills of such protections on a large scale.

This week's steel ingot production has risen three points to 54 per cent of capacity, which is possibly the first indication of the further rise that will result from the substantial sheet and strip bookings. It is possible that the peak of steel operations this year may not come until December as some mills will be unable to roll by the end of the year all of the flat rolled tonnage for which they are committed. Many buyers will undoubtedly have substantial inventories of these products at the beginning of 1939. Speculative buying was more prevalent among jobbers than among manufacturing consumers.

The strengthening of prices of flat rolled products has extended to other products that have been subject to concessions, though the evidence is not yet conclusive that a firm price level has been established all along the line. As steel operations improve, other weak spots may tend to disappear. The desire to raise steel prices for the first quarter prevails in the trade, but whether it will be possible to do so remains to be seen. A suggestion of a $2 a ton increase on some products which are not now profitable even with better operations has been made in some quarters.

FINANCIAL reports for the third quarter, which are now making their appearance, bear out the industry's contention that the breakeven point has been considerably lifted by the combination of lower prices, high wages and the elimination of basing point differentials. One of the smaller companies which operated at an average of 50 per cent in the third quarter was unable to show a profit.

Despite the poor third quarter showing and the fact that profits in the fourth quarter will be difficult because of heavy bookings at low prices, the steel industry is heartened by increasing evidences of improvement in the various lines upon which it depends for considerable of its tonnage. Some of the better feeling springs from the optimism of the automobile industry, but also from the impetus being provided by Government-financed building construction, the hope of at least modest railroad buying by December, the general clearing of the price atmosphere and indications of less hesitancy among buyers in providing for their future requirements.

Fabricated structural steel lettings total more than 33,000 tons, and there are inquiries for an additional 25,000 tons. The largest awards were 7000 tons for mill buildings for Youngstown Sheet & Tube Co., Indiana Harbor, Ind., and 4940 tons for a bridge at Rockport, Ind., and the largest new project is 9000 tons for the Pittsburgh-Harrisburg motor highway.

The improved prospects in the automobile industry have raised expectations of an output of 3,500,000 to 4,000,000 cars in 1939. Fall production of the new models probably will reach a peak within the next two or three weeks.

Aided by rising production in the automotive and farm equipment industries, shipments of pig iron and foundry coke by Chicago furnaces are 25 per cent ahead of last month.

INDUSTRIAL improvement has been reflected in an advance of $1 a ton in heavy melting steel at Cleveland, based on a sale to a mill, the first in that center in months. Prices at Pittsburgh, Chicago and Philadelphia are unchanged. THE IRON AGE scrap composite price remains at $14.17.

THE IRON AGE finished steel composite price goes back to 2.286c. a lb., from 2.211c. last week.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Oct. 25, 1938	Oct. 18, 1938	Sept. 27, 1938	Oct. 26 *1937
Rails, heavy, at mill	$40.00	$40.00	$40.00	$42.50
Light rails: Pttsburgh, Chicago, Brmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:				
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massilon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	**2.15**	1.85	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	**2.95**	*2.75	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	**3.50**	3.30	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	**2.15**	1.85	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	**3.20**	*2.90	*3.00	...

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.
* Corrected.

Cents Per Lb.	Oct. 25, 1938	Oct. 18, 1938	Sept. 27, 1938	Oct. 26 *1937
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.45	2.45	2.45	2.75
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.90
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.20	3.20	3.20	3.40
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.35	$5.35	$5.35	$5.35

*Pittsburgh prices only.

Pig Iron

Per Gross Ton:				
No. 2 fdy., Philadelphia	$22.84	$22.84	$21.84	$25.76
No. 2, Valley furnace	21.00	21.00	21.00	24.00
No. 2, Southern Cin'ti	21.06	21.06	21.06	23.69
No. 2, Birmingham	17.38	17.38	17.38	20.38
No. 2, foundry, Chicago†	21.00	21.00	21.00	24.00
Basic, del'd eastern Pa.	22.34	22.34	21.34	25.26
Basc, Valley furnace	20.50	20.50	20.50	23.50
Malleable, Chicago†	21.00	21.00	21.00	24.00
Malleable, Valley	21.00	21.00	21.00	24.00
L. S. charcoal, Chicago	28.34	28.34	28.34	30.04
Ferromanganese, seab'd carlots	92.50	92.50	92.50	102.50

†The switchng charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$14.75	$14.75	$15.25	$15.25
Heavy melting steel, Phila	14.75	14.75	14.25	15.25
Heavy melting steel, Ch'go	13.00	13.00	13.25	14.00
Carwheels, Chicago	13.25	13.25	13.75	16.50
Carwheels, Philadelphia	16.75	16.75	17.25	18.25
No. 1 cast, Pittsburgh	15.50	15.50	15.50	17.75
No. 1 cast, Philadelphia	16.75	16.75	16.25	18.25
No. 1 cast, Ch'go (net ton)	12.25	12.25	12.75	12.75
No. 1 RR. wrot., Phila.	15.25	15.25	15.25	18.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$4.25
Foundry coke, prompt	4.75	4.75	4.75	5.00

Non-Ferrous Metals

Cents per Lb., to Large Buyers:				
Electrolytic copper, Conn.	11.25	11.25	10.375	12.00
Lake copper, New York	11.375	11.375	10.50	13.125
Tin (Straits), New York	46.50	45.25	44.00	48.50
Zinc, East St. Louis	5.05	5.05	4.95	5.75
Zinc, New York	5.44	5.44	5.34	6.10
Lead, St. Louis	4.95	4.95	4.95	5.35
Lead, New York	5.10	5.10	5.10	5.50
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	18.25

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
October 25, 1938	2.286 a Lb.	$20.61 a Gross Ton	$14.17 a Gross Ton
One week ago	2.211	20.61	14.17
One month ago	2.286	20.44	14.25
One year ago	2.512c.	23.25	14.83

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1938	2.512c., May 17	2.211c., Oct. 18	$23.25, June 21	$19.61, July 6	$14.83, Aug. 9	$11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

. . THIS WEEK'S MARKET NEWS . .

STEEL OPERATIONS

. . . Rate for the country moves up to 54 per cent

STEEL ingot production has gained three points this week to 54 per cent of the country's capacity and further gains may be expected to result from recent heavy bookings of sheets and strip. In the corresponding week last year operations were at 51 per cent. Thus the present rate has crossed last year's figures for the first time this year.

The sharpest rise is in the CLEVELAND-LORAIN district, where the putting on of seven more open hearths has made an average rate of 72 per cent, up 13 points over last week. A gain of five points raises the ingot rate for YOUNGSTOWN and nearby cities to 61 per cent, the highest output in more than a year.

Ingot output in the PITTSBURGH district has moved up three points to 42 per cent, the highest level attained since last fall. WHEELING-WEIRTON operations are up two points to 78 per cent.

At CHICAGO there has been a gain of only half a point to 46.5 per cent, increases by two producers there being offset to some extent by a decrease at one plant.

Operations remain steady in the BIRMINGHAM, SOUTHERN OHIO, BUFFALO, DETROIT and EASTERN PENNSYLVANIA areas, but have dropped three points at ST. LOUIS.

The American Iron and Steel Institute's estimate of operations this week is 53.7 per cent.

NEW BUSINESS

. . . Heavy bookings of sheets and strip assure higher production

NEW business so far this month at PITTSBURGH in many cases is substantially ahead of the same period in September. This situation is not solely due to tremendous increase in flat rolled commitments but finds considerable support from hot rolled bar, semi-finished steel, and structural shape orders. Further general improvement in demand is anticipated.

Sheet and strip mill order books are well filled at CLEVELAND and YOUNGSTOWN and already shipments are increasing slowly toward a peak expected in several weeks. Principal interest from the standpoint of sales now centers upon other products outside of flat rolled. As consumer inventories of these products are low generally, active buying is expected.

Sales registered a pronounced increase at CHICAGO last week as consumers, particularly large users in the automobile industry, took heavy tonnages of sheets and strip while the price concessions were in effect. Miscellaneous consumers of these flat rolled products did not buy ahead to quite the same extent, according to most producers. Opinion is that some of the important sheet and strip consumers who covered requirements over the remainder of the year now will have to be counted out of the market during that period.

Sheet demand in SOUTHERN OHIO was moving upward at accelerated pace until the "bargain days" ended, when a return to a more conservative rate set in. Automobile interests are taking material at good rate.

Sheet and strip tonnage stepped up considerably at ST. LOUIS following the price reductions, but buying of other items was light.

New tonnage is coming in at a fair rate at BIRMINGHAM with a general run of miscellaneous business.

Bookings of sheets and strip were fairly heavy in NEW YORK and PHILADELPHIA, but demand for other products is relatively light.

PRICES

. . . Low prices on sheets and strip withdrawn Oct. 19

ON Wednesday, Oct. 19, producers of sheets and strip withdrew concessions on sheets and strip, which had amounted to $6 a ton on most grades. Thus prices on hot and cold rolled sheets are restored to 2.15c. and 3.20c. a lb. respectively and on hot and cold rolled strip to 2.15c. and 2.95c. a lb. respectively, the levels prevailing before the recent concessions. The mark-downs on galvanized sheets, long ternes and enameling stock likewise were rescinded.

This strengthening tendency is believed to have communicated itself to other products on which price concessions had become common, notably merchant wire products and plates, but there appears to be no improvement in the price situation with respect to fabricated structural steel and reinforcing bars.

SEMI-FINISHED STEEL

. . . Non-integrated mills expected to buy more freely

SEMI-FINISHED steel bookings at PITTSBURGH were a shade less last week than in the previous period. However, a considerable expansion in sheet bar bookings is anticipated from non-integrated makers, whose orders for flat rolled products were swelled somewhat last week previous to the withdrawal of lower sheet and strip prices. Considerable support is also expected from forge shops working on automotive commitments.

PIG IRON

. . . Shipments increasing, especially in the Middle West

WHILE very little new business in pig iron is being placed, shipments are increasing in some areas, notably CHICAGO and NORTHERN OHIO. Shipments of both pig iron and foundry coke in the CHICAGO district thus far in October are about 25 per cent better than in the corresponding period of September. Total iron shipments for October are expected to make it the best month so far in the year for CHICAGO producers, and about 45 per cent of a normal volume. NORTHERN OHIO producers are shipping 15 to 20 per cent more than they did in the corresponding period of September.

Foundries supplying the automobile industry are increasing their activity and are expected to show further gains. Demand from the implement and tractor manufacturers also is picking up with accelerated production schedules. Many foundries in the CHICAGO district are now running four or five days a week.

In the ST. LOUIS area operations of stove foundries have picked up and jobbing foundries are busier.

Shipments are steady from BIRMINGHAM furnaces, where the rate of

production is unchanged, 15 of 18 stacks being in blast.

Eastern furnaces are quoting on foreign inquiries. One of 10,000 tons for Loyalist Spain is reported to have been placed here. Recent export orders have been taken at around $18 a ton f.a.s.

BOLTS, NUTS, RIVETS

. . . Automotive orders better at Cleveland

AT CLEVELAND the volume of new business in bolts and nuts is growing every day, led by the automotive industry and specifications from jobbers. Some shrewd buyers are reported to be building up their inventories in the expectation that their judgment will be rewarded before long. New cap screw prices haven't had much of a test so far, but are reported to be holding well. Some automotive manufacturers have just issued blanket contracts to cap screw manufacturers.

Orders at PITTSBURGH are on a par with a week ago, with producers still hopeful of increased releases from the automotive industry.

PLATES

. . . Shipbuilding program is the principal tonnage prospect

SHIPBUILDING is one of the most promising prospects for plate tonnage in the near future as the railroads continue their policy of delayed action on their probable needs pending settlement of the wage controversy.

The Maritime Commission has not yet announced the letting contracts on 12 cargo ships on which bids were recently taken. The Sun Shipbuilding & Dry Dock Co. was low bidder and the Federal Shipbuilding & Dry Dock Co. was second low.

In the railroad field the only important tonnage in sight is for 2400 freight cars for which the Southern Railway has been inquiring. Action on this inquiry is expected within the next few weeks.

The recent break in sheet and strip prices did not affect plate prices any more than they had been previously. Concessions of $2 a ton on attractive lots have been prevalent for some weeks, particularly in the East. But there are indications that some mills are withdrawing these concessions. Meanwhile business is very dull in this product.

MERCHANT BARS

. . . Prices held firm during sheet and strip flurry

SALES of hot rolled bars at PITTSBURGH so far this month are slightly ahead of the same period last month. Some of the hesitancy in buying due to flat rolled price irregularities has disappeared.

CLEVELAND and YOUNGSTOWN producers are gratified over the remarkable manner in which merchant bar prices held firmly during the period of weakness experienced by other products this month. New merchant bar business shows a small gain over last month and OHIO sellers are actively soliciting orders. The improvement is not confined to any one particular industry, but is spread out among all consumers in general.

CHICAGO district producers expect that, with the removal of uncertainty over prices, demand for bars will recover from its recent hesitancy. Orders from the automobile industry are expected to expand as assemblies are stepped up. Increasing activity of the implement and tractor makers, likewise, is singled out as a probable source of heavier buying. Cold drawers are holding about even.

STRUCTURAL STEEL

. . . A number of large jobs placed . . . Toll highway to take 9000 tons

FABRICATED structural steel awards during the week were featured by a number of fairly large jobs. The largest were 7000 tons for mill buildings for Youngstown Sheet & Tube Co., which went to Fort Pitt Bridge Works, and 4940 tons for a bridge over the Ohio River at Rockport, Ind., which went to the Nashville Bridge Co. Others of outstanding size were: 2900 tons for apartment building, New York, to Harris Structural Steel Co.; 2200 tons for administration building at Bellevue Hospital, New York, to Lehigh Structural Steel Co.; 2000 tons for road repairs to Williamsburgh bridge, New York, to Taylor-Fichter Steel Construction Co.; 2450 tons, foundry at Mare Island Navy Yard, California, to Moore Dry Dock Co.

Outstanding among prospective jobs is 9000 tons for a section of the Pittsburgh-Harrisburg motor highway, but bids may not be taken immediately. A PHILADELPHIA court house calls for 2000 tons. A building at the Brooklyn Navy Yard will take 2000 tons. Structural fabricators in the CHICAGO district are still without much important tonnage to figure on.

Structural steel specifications received at PITTSBURGH mills in the past week declined slightly, but prospects over the next few months are considered to be very bright.

Prices on fabricated structural steel are showing no signs of recovery from recent low levels.

TUBULAR GOODS

. . . Construction demand improves . . . oil country pipe dull

ALTHOUGH oil-country demand at PITTSBURGH is suffering from the usual year-end lethargy, pressure tube requirements continue to increase slightly. Movement of standard pipe is no smaller than a week ago, with prospects for a continuation of the current trend satisfactory, due to building activity.

The construction industry continues to supply considerable impetus for tubular goods manufacturers in the CLEVELAND and YOUNGSTOWN districts. Tubular construction being used in the new model automobile seat frames is a recently opened market requiring considerable tonnage.

Resale prices in the NEW YORK merchant pipe trade are still subject to extreme concessions. A large order for pipe has been placed for the Metropolitan Life Insurance Co.'s housing project in the Bronx.

SHEETS AND STRIP

. . . Heavy tonnages booked by mills at reduced prices

PREVIOUS to the sudden withdrawal of low prices on sheets and strip on Wednesday, Oct. 19, nearly all mills booked heavy tonnages at the $6 a ton concessions which had been in effect.

Some mills were circumspect in the matter of protecting customers, insisting upon rolling specifications with the order and limiting quantities in line with the buyer's normal requirements, but others accepted blanket coverages from regular customers who could not at this time furnish full rolling specifications. In all instances, however, it appears that mills are insisting on completion of shipments

against these low-priced commitments by Dec. 31.

Almost all important users of these commodities have covered for all of the material they will require this year, and, if specifications are heavy in the last few weeks of the month, as they undoubtedly will be, many users will have sufficient flat rolled steel to carry them through the first quarter of 1939.

An interesting sidelight of the price dip was the amazing speed shown by the Department of Standards and Purchases of the State of New York, which had planned to buy 1783 tons of 24-gage license plate material in November, but which suddenly cut the Gordian knot of official red tape, called for bids in the matter of a few days and opened them on Friday, Oct. 21. Although prices on sheets had been withdrawn on Wednesday, the low bidder, Albany Steel & Iron Co., calculated its bid on a 1.85c. base price, and gave an additional concession of 2 per cent in 30 days. Jones & Laughlin Steel Corp. was named as the supplier.

REINFORCING BARS

. . . Awards and inquiries in good volume . . . Prices low

ACUTE price weakness, particularly in the NEW YORK area, continues to mark all competitive bidding on reinforcing bar projects. Some of the prices that have been quoted work back to 1.50c. a lb. or less at Sparrows Point, Md., the basing point for the Eastern Seaboard. It is reported from PITTSBURGH that efforts are being made there to stabilize reinforcing bar prices at higher than going levels.

The week's largest award was 1800 tons for an apartment building on Riverside Drive, New York, which will take 1800 tons. This went to Bethlehem Steel Co.

Several thousand tons have been awarded in the ST. LOUIS area, but mostly in small jobs up to 60 tons, which are not recorded in THE IRON AGE listings of awards.

The Eastman Kodak Co., Rochester, N. Y., is in the market for 1800 tons for a factory addition.

Specifications being received by PITTSBURGH mills are running slightly ahead of those of last month.

(Details of reinforcing bar awards and inquiries will be found on page 81.)

WIRE PRODUCTS

. . . Some mills have withdrawn concessions on nails

WEAKNESS in prices of wire nails and other merchant products which brought about sales of common nails to jobbers at $2 per 100 lb. keg and roofing nails at about the same price, is being eliminated, according to reports from principal centers.

Total wire business at PITTSBURGH is running slightly over 5 per cent ahead of the same period last month. Brightest prospects are in the manufacturers' wire category, due to forthcoming support from the automobile industry and other miscellaneous consumers. Recent concessions to jobbers on merchant wire products having been withdrawn, the merchant wire price structure appears to be firmer than for some time. Coverages made before the elimination of irregularities were not large.

Wire sales offices in the CHICAGO district are anticipating a marked strengthening of demand for manufacturers' wire now that expectations of a possible price cut have been dissipated.

At CLEVELAND manufacturers report a definite gain over September, due to manufacturers wire in connection with the automotive trade. Prices in many sections of the nation are showing a tendency to become firmer than heretofore.

TIN PLATE

. . . Operations at 25 to 30 per cent . . . Price announcement soon

TIN plate operations are unchanged this week at 25 to 30 per cent. Some anticipatory tonnage has been placed on the books, subject to shipping releases in the future. Little or no change in present market conditions is expected until a formal tin plate price announcement is made. This may come within the next few weeks.

WAREHOUSE BUSINESS

. . . Jobbers sales in Chicago in an upward trend

WAREHOUSE sales in the CHICAGO district thus far in October have continued the expansion shown through August and September. Outlook in the trade is that the improvement will carry through the end of the month. The increase to this point has been of only moderate proportions, it is reported, but still enough to establish an upward trend. This is particularly encouraging to the jobbers because past experience shows the comparative October volume to be a reliable indicator of that for the ensuing year.

RAILROAD BUYING

. . . Rail purchases expected later in the year

TWO railroad presidents during the past week stated that their roads would come into the market later in the year for 1939 rail requirements. They were W. M. Jeffers of the Union Pacific and J. B. Hill of the Louisville & Nashville.

The Ensley (Ala.) rail mill will resume operations during the week of Oct. 31 to roll the 3000 tons of rails recently placed by the Mobile & Ohio. Unless additional business is booked meanwhile, the mill will close down again after the order is rolled.

The Alaska Railroad is inquiring for one type 4-6-2 locomotive. The Kansas City (Mo.) Terminal Railway has asked for prices on three 780 hp. diesel switching locomotives. The Pennsylvania Railroad has authorized the construction in its own shops at Altoona, Pa., of 25 locomotive tenders of 21,000-gal. capacity each.

. . . PIPE LINES . . .

Champlin Refining Co., Enid, Okla., plans welded steel pipe line from oil field near Nash, Grant County, Okla., to Enid, about 25 miles, for crude oil transmission to refinery at latter place. Cost over $100,000 with pumping station and other operating facilities.

United States Engineer Office, Vicksburg, Miss., asks bids until Nov. 1 for four steel discharge pipes and one cast steel pipe flange (Circular 86).

Panguitch, Utah, plans about 30,000 ft. of 10-in. steel pipe for main water line from new water source, now being developed, to municipal limits. Fund of $81,818 has been arranged through Federal grant and loan for this and other waterworks installation.

Metropolitan Water District, Los Angeles, has let contract to Emsco Derrick & Equipment Co., 6811 South Alameda Street, for about 13½ miles of steel pipe lines for water system, at $1,091,735.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Col. T. A. Leisen, secretary, plans pipe lines for gas

transmission in district No. 860, recently created.

Bell Oil & Gas Co., Tulsa, Okla., will use 4-in. welded steel pipe for new gasoline transmission line from oil refinery at Grandfield, Okla., to point near Burkburnett, Tex., about 11 miles, recently noted in these columns. Company also plans bulk terminal on highway near last noted place for distribution to wholesale customers in that district.

Brandon, Miss., plans pipe lines for municipal natural gas distribution. Bond issue of $25,000 has recently been voted and further financing will be arranged through Federal aid.

Gulf Natural Gas Co., Houma, La., has let contract to Williams Brothers, Inc., National Bank of Tulsa Building, Tulsa, Okla., for new welded steel pipe line from Fohs Oil Co., gas field properties near Lake Long, La., to Mathews, La Fourche County, La., for natural gas transmission. Connection will be made with main pipe line at latter place.

Waintown Gas & Oil Co., Ltd., Vermillion, Alta., plans steel pipe lines for natural gas distribution in municipality, where franchise has been granted. Cost over $60,000 with main welded steel pipe line for connection with supply source, control station in municipality and other operating facilities.

Fort Huachuca, Ariz., has opened bids on 215 tons of 10¾-in. o.d. pipe.

REINFORCING STEEL

. . . Awards of 8200 tons; 4000 tons in new projects.

NORTH ATLANTIC STATES

AWARDS

1800 Tons, New York, apartment, 140 Riverside Drive, to Bethlehem Steel Co., Bethlehem, Pa., through Walter Kidde Contractors, Inc., New York.

600 Tons, Green Haven, N. Y., State prison, to Sweets Steel Co., Williamsport, N. Y. through Arthur Gallow, Inc., New York, general contractor.

450 Tons, Gloversville, N. Y., filtration plant, to Jones & Laughlin Steel Corp., Pittsburgh, through Lange-Finn Construction Co., Inc., Albany, N. Y.

250 Tons, Malden, Mass., high school to Concrete Steel Co., Boston.

220 Tons, Hartford, Conn., Putnam Street school, to Sherrer Steel Co., Hartford.

175 Tons, Gloucester, Mass., high school to Truscon Steel Co., Youngstown; Daniel Cunningham Construction Co., Boston, is contractor.

140 Tons, Warwick, R. I., high school, to Truscon Steel Co., Youngstown.

100 Tons, Newburyport, Mass., stadium, to Truscon Steel Co., Youngstown.

100 Tons, Niagara County, N. Y., sanitarium, to Joseph T. Ryerson & Son, Inc., Buffalo.

100 Tons, Buffalo, factory building for Spencer-Lens Co., to Joseph T. Ryerson & Son, Inc., Buffalo.

CENTRAL AND WESTERN STATES

750 Tons, Los Angeles, piles for wharf for Los Angeles harbor commissioners, to Blue Diamond Corp., Los Angeles, through Warren Southwest, Inc., Wilmington, Cal.

600 Tons, Oklahoma City, State highway bridge, to Sheffield Steel Corp., Kansas City, Mo., through Forcum James Co., contractor.

275 Tons, Detroit, Denby School, to McRae Steel Co., Detroit.

200 Tons, Brainerd, Minn., Lowell and Lincoln schools, to Bethlehem Steel Co., Bethlehem, Pa. through J. P. Hagstrom, contractor.

200 Tons, San Diego, Cal., destroyer base school, to Consolidated Steel Corp., Ltd., Los Angeles, through Charles L. Hoskins, San Diego, contractor.

190 Tons, Cincinnati, chemistry building, University of Cincinnati, to West Virginia Rail Co., Huntington, W. Va.

180 Tons, Riverside, Cal., barracks at March Field, to Consolidated Steel Corp., Ltd., Los Angeles, through Johnson, Drake & Piper, Los Angeles, contractors.

172 Tons, Muskingum County, Ohio, State bridge, to W. P. McCarren, Walhonding, Ohio.

159 Tons, Corcoran, Cal., high school, to Kyle & Co., Fresno, Cal., through W. W. Petley, Los Angeles, contractor.

150 Tons, Dogtooth Bend, Mo., culvert, to Bethlehem Steel Co., Bethlehem, Pa., through Stiers Bros. Construction Co., St. Louis, contractor.

136 Tons, Strasburg and Anton, Colo., highway work, to Eaton Metal Products Co., Denver, through Peter Kiewit Sons Co., Omaha, contractor.

130 Tons, Bloomington, Ill., State Farm Mutual Insurance Co. building, to Laclede Steel Co., St. Louis, through John Feimley Co., contractor.

100 Tons, East Lansing, Mich., hospital, to West Virginia Rail Co., through J. A. Utley Co., Detroit, contractor.

NEW REINFORCING BAR PROJECTS

NORTH ATLANTIC STATES

700 Tons, New York, building, Veteran's Hospital in Bronx.

400 Tons, Syracuse, N. Y., housing project; bids Nov. 4.

200 Tons, Danbury, Vt., municipal building.

100 Tons, Queens, N. Y., ventilation building, Queens Mid-town tunnel; bids close Nov. 15.

100 Tons, North Adams, Mass., training school.

CENTRAL AND WESTERN STATES

240 Tons, Chicago, Oakland office building, Illinois Bell Telephone Co.

230 Tons, Rantoul, Ill., barracks.

225 Tons, Kalamazoo, Mich., Norge Co.

200 Tons, Decatur, Ill., outfall sewer.

180 Tons, Cincinnati, incinerator for city.

160 Tons, State of Illinois, highway work.

135 Tons, Chicago, National Bank building.

100 Tons, Chicago, armory.

Unstated tonnage, Ashland, Ky., penitentiary building.

. CAST IRON PIPE .

Portland, Me., Water District has awarded 38,000 ft. of 48-in. and 41,000 ft. of 30-in. pipe for a water system between Portland and Gorham, Me., to Lockjoint Pipe Co.

Bath, Me., Water District has awarded 200 tons of 16-in. submarine water pipe to United States Pipe & Foundry Co.

Newton, Mass., has awarded 700 tons of 30-in. pipe for a supply main between that city and Needham, Mass., to Warren Foundry & Pipe Corp.

Sanford, Me., closed bids Oct. 26 on 300 tons of 16-in. pipe.

York Village, Me., will close bids Oct. 31 on $75,000 worth of 6 to 16-in. pipe. Bids will be taken by James H. Lucas, superintendent of York Water District.

Crossville, Tenn., plans about five miles, various sizes, for water system; also new filtration plant and other waterworks installation. Cost about $85,000. Financing is being arranged.

Manning, Iowa, closes bids Nov. 7 for pipe for water system and other waterworks installation, including 120,000-gal. concrete reservoir, pumping station and chlorinator plant. Young & Stanley, Inc., Muscatine, Iowa, is consulting engineer.

Morgantown, N. C., asks bids until Nov. 1 for about 90,000 ft. of 2 to 12-in. for water system and other waterworks equipment; also for equipment for sewage system. Fund of about $265,000 has been arranged for both projects. Chester F. Lewis is town manager and engineer.

Riesel, Tex., plans pipe lines for water system and other waterworks installation. Cost about $51,000, of which $21,000 will represent a Federal grant. Joseph J. Rady, Majestic Building, Fort Worth, Tex., is consulting engineer.

Steubenville, Ohio, has awarded contract for a sewage line to Harry Shullow, Akron, who has ordered 200 tons of cast iron pipe from J. B. Clow & Sons Co., Cleveland.

Powhattan Point, Ohio, will take bids Nov. 17 on a water distribution system requiring about 300 tons of cast iron pipe.

Pueblo, Colo., plans 24-in. pipe in West Fourth Street, from Grand Avenue to Greenwood Street, and in part of latter thoroughfare, for main water supply; also new 36-in. line for connection with pumping station. Cost about $35,900, of which $16,155 will represent a Federal grant.

Leitchfield, Ky., closes bids Nov. 1 for pipe for water system, service connections and meters (Contract No. 3); wells, water reservoir and pumping station (Contract No. 1); one 75,000-gal. elevated steel tank and tower (Contract No. 2). Howard K. Bell, McClelland Building, Lexington, Ky., is consulting engineer.

Oakwood, Tex., plans pipe lines for water system and other waterworks installation. Bids are scheduled to be asked early in November. M. C. St. John, 4101 Polk Avenue, Houston, is consulting engineer.

Shidler, Okla., plans pipe line extensions and replacements in water system; also other waterworks installation. Cost about $140,500. Financing is being arranged through Federal aid. Thomas G. Banks, Liberty National Bank Building, Oklahoma City, Okla., is consulting engineer.

Clatskanie, Ore., plans pipe line extensions and replacements in water system; also new 500,000-gal. concrete reservoir. Cost about $43,900. Financing has been arranged through Federal aid.

Hickory, Miss., closes bids Nov 4 for pipe for water system; also for other waterworks installation, including 75,000-gal. elevated steel tank and tower, pumping station, hydrants, etc. Financing has been arranged through Federal aid. John M. Gilfillan & Associates, Deposit Guarantee Bank Building, Jackson, Miss., are consulting engineers.

Jacksonville, Ala., asks bids until Nov. 4 for pipe for water system and other waterworks installation. Cost about $80,000. Financing has been arranged through Federal aid. J. W. Goodwin Engineering Co., Martin Building, Birmingham, is consulting engineer.

East Bay Municipal Utility District, Oakland, Cal., has awarded 20,000 ft. of 8-in., 5000 ft. of 10-in. and 2400 ft. of 6-in. Class 150 pipe, to United States Pipe & Foundry Co., San Francisco.

Yakima, Wash., has placed 2124 ft. of 12-in. and 12,024 ft. of 6-in. pipe with United States Pipe & Foundry Co., San Francisco.

Amalga, Utah, has awarded 325 tons of pipe for water system improvement to Pacific States Cast Iron Pipe Co., Provo, Utah.

Medford, Ore., asks bids Nov. 10 for a water system at estimated cost of $35,750.

Rogue River, Ore., asks bids Nov. 7 for construction of a water system to cost about $46,000.

NON-FERROUS

. . . Sales recede slightly, but a better volume of shipments creates a stronger undertone in all markets.

CHIEF interest in the non-ferrous markets in the past week was the ability of the domestic prices to withstand the bearish sentiment that permeated the foreign markets early in the week when the foreign cartel announced the removal of production restrictions. The temporary lull in buying experienced by all sellers in the past week is credited to the heavy covering of recent weeks and is not considered indicative of a new trend in consumption. The increasing volume of releases anticipating specified delivery dates has added considerable strength to the market position of the various metals. The poor domestic demand for copper in the past week was counteracted to a great extent by the continued high level of export demands. Domestic producers' quotations remain unchanged at 11.25c. per lb., Connecticut Valley, but the export equivalent has risen from 11.15c. a week ago to 11.30c. this morning.

LEAD sales in the past week totaled about 10,000 tons, or about 6000 tons below the previous week's total, with the buying equally divided between October and November. The September statistics showed a further decrease in stocks and a slight gain in shipments. Stocks now stand at 131,000 tons, the lowest since December, 1937. Domestic prices are unchanged at 4.95c. per lb., St. Louis.

ZINC buying in the past week dropped to 1797 tons from 9000 tons a week ago. Shipments, however, are still in good volume, totaling 4077 tons for the week. In view of the 41,556-ton backlog of undelivered orders and the improving rate of consumption, the week's recession in sales has had no noticeable effect on market sentiment. Domestic prices are very firm at 5.05c., East St. Louis, while the London price has been slowly recovering from the reaction of a week ago. On first call this morning in London 3.28c. a lb. was bid on prompt spelter.

Tin buying by tin plate makers in the past week, at prices which rose to a high of 46.50c., New York, today, provided sellers with a fairly active week. Apparently buyers feel that present prices are "bargains" and are extensively covering their needs well into the coming year. Prices today were at the highest level since Nov. 1, 1937.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Oct. 19	Oct. 20	Oct. 21	Oct. 22	Oct. 24	Oct. 25
Electro. copper[1]	11.25	11.25	11.25	11.25	11.25	11.25
Lake copper	11.375	11.375	11.375	11.375	11.375	11.375
Straits tin, New York	45.65	45.25	45.50	...	46.00	46.50
Zinc, East St. Louis[2]	5.05	5.05	5.05	5.05	5.05	5.05
Lead, St. Louis[3]	4.95	4.95	4.95	4.95	4.95	4.95

[1] Delivered Conn. Valley, deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Prices

Base per lb., Delivered

	New York	Cleveland
Tin, Straits pig	47.00c.	50.00c.
Copper, lake	12.25c.	12.375c.
Copper, electro	11.50c.	12.375c.
Copper, castings	11.25c.	11.875c.
*Copper sheets, hot-rolled	19.375c.	19.375c.
*High brass sheets	17.50c.	17.50c.
*Seamless brass tubes	20.25c.	20.25c.
*Seamless copper tubes	19.875c.	19.875c.
*Brass rods	13.375c.	13.375c.
Zinc slabs	6.50c.	7.50c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.875c.	5.60c.
Lead, bar	6.625c.	8.75c.
Lead sheets, cut	8.25c.	8.25c.
Antimony, Asiatic	15.00c.	17.75c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	29.25c.	30.00c.
Babbitt metal, commercial grade	20.25c.	22.75c.

* These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

Old Metals Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.75c.	9.50c.
Copper, hvy. and wire	7.75c.	8.25c.
Copper, light and bottoms	7.00c.	7.25c.
Brass, heavy	4.625c.	5.125c.
Brass, light	3.625c.	4.375c.
Hvy. machine composition	7.25c.	8.75c.
No. 1 yel. brass turnings	4.50c.	5.00c.
No. 1 red brass or compos. turnings	6.625c.	7.25c.
Lead, heavy	4.125c.	5.00c.
Cast aluminum	7.00c.	8.25c.
Sheet aluminum	11.25c.	12.75c.
Zinc	2.50c.	3.75c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt, No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 12.25c. a lb. QUICKSILVER, $75-$78 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11.625c. a lb. lcl.

. . . CANADA . . .

. . . Orders for munitions are expected in the Dominion.

TORONTO, Oct. 25.—Steel interests are looking forward to orders from Great Britain and the Canadian Government for munitions. While some orders have been awarded in this connection, others are pending. Airplane contracts also are expected, but so far have not materialized, outside the British contract for bombers which are being made at Port Arthur by the Canadian Car & Foundry Co. Demand for agricultural implements is increasing steadily and new business is reported from the automotive industry.

Pig iron melt is moving up slowly, with a higher rate predicted for the closing two months of the year. Current rate is approximately 60 per cent.

Imports at Philadelphia

PHILADELPHIA.—The following iron and steel imports were received here during the past week: 4498 tons of chrome ore from British South Africa; 250 tons of ferromanganese from Czechoslovakia; 19 tons of steel tubes, one ton of steel bars from Sweden; 13 tons of steel bands, 75 tons of steel bars, and 88 tons of structural shapes from Belgium, and one ton of steel shapes from France.

FABRICATED STEEL

NORTH ATLANTIC STATES

AWARDS

2900 Tons, New York, apartment house for 140 Riverside Drive, Inc., to Harris Structural Steel Co., Plainfield, N. J.

2200 Tons, New York, administration building, Bellevue Hospital, to Lehigh Structural Steel Co., Allentown, Pa.

2000 Tons, New York, road repairs, Williamsburg Bridge, to Taylor-Fichter Steel Construction Co., New York.

2000 Tons, White Hill, Pa., industrial school for boys, to Bethlehem Steel Co., Bethlehem, Pa.

600 Tons, Westfield, Mass., bridge, to Bethlehem Steel Co., Bethlehem, Pa.; Daniel O'Connell's Sons, Inc., Holyoke, Mass., contractor.

465 Tons, Farmington, Me., bridge, to Lackawanna Steel Construction Co., Buffalo.

465 Tons, Yonkers, N. Y., Fleetwood Apartments, Claremont Steel & Ornamental Iron Co., New York.

320 Tons, Coatesville, Pa., high school, Phoenix Bridge Co., Phoenixville, Pa.

300 Tons, Charlemont-Hawley, Mass., bridges, to Bethlehem Steel Co., Bethlehem, Pa.; B. A. Gardetto, Inc., Boston, contractor.

300 Tons, Oil City, Pa., vocational addition to high school, to Truscon Steel Co., Youngstown.

290 Tons, Kearny, N. J., Kearny Avenue bridge, to American Bridge Co., Pittsburgh; Thomas Galls, general contractor.

270 Tons, Bucks County, Pa., bridge, to American Bridge Co., Pittsburgh.

230 Tons, Bridgeport, Conn., addition Bridgeport Brass Co., to Fort Pitt Bridge Works Co., Pittsburgh.

204 Tons, Lockport, N. Y., hospital building, to Ernst Iron Works, Inc., Buffalo; Lauer & Mack, Niagara Falls, N. Y., general contractors.

200 Tons, Bradford, Pa., school, to Buffalo Structural Steel Co., Buffalo.

195 Tons, New York, Swift & Co., World's Fair building, to Harris Structural Steel Co., Plainfield, N. J.

185 Tons, Carney's Point, N. J., E. I. duPont deNemours & Co., neoprene plant C, to Belmont Iron Works, Philadelphia.

150 Tons, Charlestown, Mass., General Baking Co. garage, to Lackawanna Steel Construction Co., Buffalo.

SOUTH AND SOUTHWEST

450 Tons, Port Arthur, Tex., power station for Texas Co., to American Bridge Co., Pittsburgh.

255 Tons, Marshall, Tex., Bureau of Reclamation, Ford Dam Specification 110D, to Hansell-Elcock Co., Chicago.

CENTRAL STATES

7000 Tons, Indiana Harbor, Ind., mill building for Youngstown Sheet & Tube Co., to Fort Pitt Bridge Works.

4940 Tons, Rockport, Ind., Ohio River bridge, to Nashville Bridge Co., Nashville, Tenn.

590 Tons, Detroit, McKenzie High School addition, to American Bridge Co., Pittsburgh; A. W. Kutche, general contractor.

485 Tons, Brady, Neb., penstock supports and miscellaneous steel, 225 tons to Lincoln Steel Works, Lincoln, Neb., and 260 tons to Pittsburgh-DesMoines Steel Co., Pittsburgh.

450 Tons, Detroit, Denby High School addition, to Fort Pitt Bridge Works Co., Pittsburgh; Patterson Engineering Co., general contractor.

400 Tons, Alpena, Mich., Second Avenue bridge, to R. C. Mahon Co., Detroit, W. J. Storen Co., general contractor.

400 Tons, Bloomington, Ill., office building, to Mississippi Valley Structural Steel Co., St. Louis; John Felmley Co., general contractor.

400 Tons, Cleveland, East Ninth Street bridge, to American Bridge Co., through National Engineering & Contracting Co.

260 Tons, Rock Island, Ill., waterworks; 160 tons to Rock Island Bridge & Iron Works, Rock Island; 100 tons to Youngstown Sheet & Tube Co., Youngstown.

250 Tons, Minneapolis, State bridge No. 5860, to Bethlehem Steel Co., Bethlehem, Pa.

240 Tons, Columbus, Ohio, forge shop for Columbus Auto Parts Co., to Rogers Structural Steel Co., Corry, Pa., through H. K. Ferguson Co., Cleveland, general contractor.

185 Tons, East St. Louis, Ill., carbonizing plant, Coal Carbonizing Co., to Stupp Brothers Bridge & Iron Co., St. Louis.

175 Tons, York, Neb., State subway 143-H-1, to St. Joseph Structural Steel Co., St. Joseph, Mo.

WESTERN STATES

2450 Tons, Mare Island Navy Yard, foundry (Specification 8816) to Moore Dry Dock Co., Oakland, Cal.

209 Tons, Leavenworth, Wash., fish hatchery, to American Bridge Co., Seattle.

175 Tons, Durango, Colo., truss span, to Kansas City Structural Steel Co., Kansas City, Kan.

163 Tons, Sacramento, Cal., Sutter Slough bridge, to Minneapolis-Moline Power Implement Co., Minneapolis, through Lord & Bishop, Sacramento, contractor.

160 Tons, Los Angeles County, Cal., trash racks, San Gabriel Dam, to Pacific Iron & Steel Co., Los Angeles.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

9000 Tons, Harrisburg, Pa., bridges and viaducts, Pittsburgh-Harrisburg toll highway. Owing to nature of project, considerable time will elapse before bids are taken.

2000 Tons, Brooklyn, building No. 4, Navy Yard.

2000 Tons, Philadelphia, court house; bids bids Nov. 10.

1120 Tons, Philadelphia, pipe and copper shop for Navy Yard.

1100 Tons, Queens, N. Y., ventilation building, Queens Mid-Town Tunnel; bids Nov. 15.

550 Tons, Whitestone, N. Y., buildings for Richardson & Boynton Co.

450 Tons, Pittsburgh, bridge work, Buttermilk Hollow Road, for Allegheny County.

350 Tons, New York, George Washington bridge approach, for Port of New York Authority.

300 Tons, Ridgefield, Conn., school building addition.

300 Tons, Nashua, N. H., city hall and police station.

300 Tons, Monroe-Rowe-Heath-Colrain, Mass., bridges; Lane Construction Co., Meriden, Conn., contractor.

300 Tons, Jamaica, N. Y., garage and office building for Green Bus Co.

300 Tons, Eden, N. Y., school.

275 Tons, Pulaski, N. Y., school.

250 Tons, Pittsburgh, bridge work, Curry Hollow Road for Allegheny County.

225 Tons, Pittsburgh, repairs to Bloomfield bridge.

200 Tons, Queens, N. Y., public school No. 159, Bethlehem Fabricators, Inc., Bethlehem, Pa., low bidder.

200 Tons, Buckland-Lyden, Mass., bridges; Kelleher Corp., Turners Falls, Mass., contractor.

170 Tons, Elmira, N. Y., building alterations for Elmira Free Academy.

150 Tons, New York, steel curbing for Treasury Department.

150 Tons, Chappaqua, N. Y., school, general contract to Lebine Bros., Buffalo.

THE SOUTH

572 Tons, Merrill, Miss., bridge; bids in.

500 Tons, Lexington, Ky., biological science building for University of Kentucky.

423 Tons, Landon, Miss., bridge; bids in.

370 Tons, Chattanooga, Tenn., Star Box & Printing Co. building; H. K. Ferguson Co., Cleveland, general contractor.

220 Tons, Ashland, Ky., Federal jail.

CENTRAL STATES

700 Tons, State of Illinois, four highway bridges.

700 Tons, Lead, S. D., hoist house, head frame, etc., for Homestake Mining Co.

400 Tons, Cincinnati, municipal garage and brake test building.

225 Tons, Lodi, Wis., bridge.

200 Tons, Cleveland, building for Greyhound lines; bids soon.

165 Tons, Cincinnati, alterations, city incinerator plants.

115 Tons, Freeport, Ill., storage building for Stover Mfg. & Engineering Co.

WESTERN STATES

1350 Tons, San Clemento Island, Cal., Navy hangars; National Iron Works, San Diego, Cal., low bidder; Fred F. Greenfield Co., Los Angeles, general contractor.

1100 Tons, Odair, Wash., drum gate anchorages, Specification 805, for Bureau of Reclamation.

750 Tons, Delta, Cal., third crossing bridge for Shasta Dam railroad relocation; bids Nov. 17.

225 Tons, Delta, Cal., fourth crossing bridge for Shasta Dam railroad relocation; bids Nov. 17.

170 Tons, Bonneville, Ore., stop logs; Worden-Allen Co., Milwaukee, low bidder.

HAWAII

2556 Tons, Honolulu, sheet piling and shapes for United States Engineer; Columbia Steel Co., San Francisco, low bidder.

FABRICATED PLATES

AWARDS

1300 Tons, New York, caissons, Criminal Courts building, to Seaboard Steel Products Corp., New York.

1110 Tons, Dorchester, Mass., Morton Street pipe line, to Walsh Holyoke Steam Boiler Co., Holyoke, Mass.

380 Tons, Boston, United States Procurement Office, two steel standpipes, to Tippett & Wood, Phillipsburgh, N. J.

250 Tons, Newburyport, Mass., water tank, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

200 Tons, Webster, Mass., standpipe to Pittsburgh-Des Moines Steel Co., Pittsburgh.

150 Tons, Foxboro, Mass., standpipe to Chicago Bridge & Iron Works, Chicago.

PLATE PROJECTS

Unstated tonnage, San Diego, Cal., 400,000-gal. diesel oil tank and appurtenant pipes for 11th Naval district; bids Nov. 8.

SHEET PILING

AWARDS

800 Tons, Cleveland, WPA work at Gordon Park, to Republic Structural Iron Works, Cleveland.

NEW PROJECT

400 Tons, Cleveland, Cuyahoga River improvement; bids Oct. 27.

IRON AND STEEL SCRAP

. . . Prices are unchanged in a dull market . . . Composite remains at $14.17.

OCT. 25.—Unaffected by the rebound of steel mill operations after a slight decline the previous week and the restoration of sheet prices, the scrap market plods along at an even keel. Neither strength nor weakness is apparent in present prices, and the sideward drift is due almost entirely to the absence of any important mill sales. Prime grades are unchanged in price in all market centers, and the composite price of No. 1 steel remains at $14.17. Blast furnace grades are somewhat stronger at Buffalo, and a few adjustments have been made in buying prices of Cincinnati dealers, but these are largely nominal. Breakable cast grades are weaker in the East.

Export buying prices are stronger at Boston, but practically unchanged at New York and Philadelphia. Rumors of new export orders are discredited.

Cleveland

The first sale into mill consumption here in many months was consummated this week on Tuesday, and as a result the market on No. 1 heavy melting is quoted up $1 per ton at a range of $13.50 to $14.00. Tonnage figures are unavailable at this writing as it is understood material is still being picked up.

Pittsburgh

The market is no stronger than a week ago despite the fact that steel operations have improved some in the past week. No. 1 heavy melting steel remains unchanged at $14.50 to $15 a ton, with $15 still being paid by brokers for some locations in the district. Odd-lot tonnages are being picked up by some dealers at less than $14.50. Some yard dealers are becoming uneasy because of the long periods between consumer buying.

Chicago

The scrap market here continues dull, with No. 1 heavy melting steel still quoted $13 flat. As yet, no important mill sale has been reported at higher than this level, although expectations still are that the next transaction will be at $13.50. Dealers remain reluctant to sell at prevailing prices.

Philadelphia

Sentiment in eastern Pennsylvania is mixed, with the market as a whole at the moment on the soft side. Scattered buying for export delivery and the absence of test sales in the domestic market, however, combine to hold quoted price levels unchanged from last week. Scattered lots of material are going into local plants on old orders, but the operating rate here will have to show considerably more buoyancy before much new business comes into the market. One boat is currently loading at Port Richmond, and another boat is expected in before the month's end.

Youngstown

Quotations here are holding up well, although large sales are lacking. One Youngstown dealer in the last few days picked up 300 tons of scrapped street car rails on a high bid of $14 per ton.

Buffalo

A few small sales of cast iron borings have taken place at a price reported to be in the neighborhood of $8 to $8.50. Any large sales of scrap which may have been anticipated have failed to materialize as yet, dealers report. No. 1 heavy melting steel continues to hold at $14 to $14.50, with the largest district consumer still out of the market.

St. Louis

The market for scrap iron at St. Louis is steady, and prices are unchanged. There is no buying by the mills in the district, and none is contemplated now. Railroad offerings, which are heavier include: Chicago, Rock Island & Pacific, 4200 tons; Chicago, Milwaukee, St. Paul & Pacific, 3630 tons; Baltimore & Ohio, 6800 tons; Alton, 1350 tons, and Chicago, Burlington & Quincy, 3800 tons.

Cincinnati

The old materials market is still quiet. Some small trading is reported, but mill buying is negligible. Dealers are tending more careful in the face of anticipated business improvement. Adjustment in Cincinnati foundry items has been made to bring the market more in line with other districts, but quotations are still nominal.

Detroit

The Detroit market has been relatively inactive for the greater part of a week, but toward the end of this week a group of automobile companies will close bidding on their lists with substantial tonnages offered as a test of the market. It is rumored that buying pends in this area, with feelers already out from several sources.

New York

Reports of new orders from European sources are denied here. Meanwhile shipments are going steadily forward on old orders, and scrap is coming out as freely as it has any time this year. Export buying prices are practically unchanged, but the spread on the low side has been eliminated in recognition of a price stability that has prevailed now for some weeks. Shipments of material on cars into eastern Pennsylvania have been reduced to practically nothing. One of the principal consumers of heavy breakable cast, prime item in this market, is holding up shipments at present, and buying prices have eased off.

Boston

Activity in the export market is gathering momentum and prices are higher as a result, averaging 75c. a ton. A boat scheduled to load this week at Providence was switched to Portland, Me., but next month at least two steamers will load at the former port. Shipments from this port are being made regularly now. In the domestic market breakable cast prices have dropped perceptibly due to slack buying. For turnings the general price is now $3.38 a ton on cars, a price generally unattractive to owners of such material. Thus stocks in manufacturers' yards are accumulating.

Supreme Court Ruling On Sitdowns Possible

WASHINGTON.—Questions involving the sit-down strike will be ruled on by the Supreme Court if the Court decides to grant a Labor Board request for reviewing a decision of the Circuit Court of Appeals in Chicago that the Fansteel Metallurgical Corp. did not have to comply with an NLRB order to reinstate 92 sit-down strikers.

In its request for review of the case, the Board upheld its right to order reinstatement of the striking workers because of the company's alleged unfair labor practices and "despite any acts of violence." Characterizing the question as of "basic importance" in administering the Wagner Act, the NLRB petition said:

"If employee misconduct terminates their status as employees under the act, exempts employers from their duties imposed by the act to refrain from interfering with, restraining or coercing their employees and to bargain collectively with their representatives, and prevents the board from issuing remedial orders to correct unfair labor practices, a large field in which the board's activities are of the most vital importance are put beyond the powers intended to be conferred upon the board by Congress."

The decision of the lower court was that sit-down strike participation by employees and injury of company property removed the necessity of rehiring the strikers. It cannot be denied, the court said, that an employer is warranted in discharging his employees, and severing that relationship, when they take and retain exclusive possession of his property against his will.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.50 to	$15.00
Railroad hvy. mltng..	15.75 to	16.25
No. 2 hvy. mltng. steel	13.50 to	14.00
Scrap rails	16.00 to	16.50
Rails 3 ft. and under..	17.00 to	17.50
Comp. sheet steel	14.50 to	15.00
Hand bundled sheets..	13.50 to	14.00
Hvy. steel axle turn..	13.50 to	14.00
Machine shop turn....	9.50 to	10.00
Short shov. turn.....	9.50 to	10.00
Mixed bor. & turn....	8.25 to	8.75
Cast iron borings.....	8.25 to	8.75
Cast iron carwheels...	14.50 to	15.00
Hvy. breakable cast...	12.50 to	13.00
No. 1 cupola cast.....	15.25 to	15.75
RRfi knuckles & cplrs.	16.50 to	17.00
Rail coil & leaf springs	16.50 to	17.00
Rolled steel wheels...	16.50 to	17.00
Low phos. billet crops.	17.50 to	18.00
Low phos. punchings.	16.00 to	16.50
Low phos. plate	15.50 to	16.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.50 to	$15.00
No. 2 hvy. mltng. steel.	13.00 to	13.50
Hydraulic bund., new.	14.50 to	15.00
Hydraulic bund., old..	11.50 to	12.00
Steel rails for rolling.	17.00 to	17.50
Cast iron carwheels...	16.50 to	17.00
Hvy. breakable cast..	16.00 to	16.50
No. 1 cast	16.50 to	17.00
Stove plate (steel wks.)	13.00 to	13.50
Railroad malleable ...	15.50 to	16.00
Machine shop turn....	8.00 to	8.50
No. 1 blast furnace....	6.50 to	7.00
Cast borings	6.50 to	7.00
Heavy axle turnings..	10.00 to	10.50
No. 1 low phos. hvy...	16.50 to	17.00
Couplers & knuckles..	16.50 to	17.00
Rolled steel wheels ...	16.50 to	17.00
Steel axles	21.50 to	22.00
Shafting	19.50 to	20.00
No. 1 RR. wrought....	15.00 to	15.50
Spec. iron & steel pipe	12.00 to	12.50
No. 1 forge fire	11.00 to	11.50
Cast borings (chem.)..	9.50 to	10.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton	
Hvy. mltng. steel	....	$13.00
Auto. hvy. mltng. steel alloy free	$11.00 to	11.50
No. 2 auto. steel.....	10.50 to	11.00
Shoveling steel	12.50 to	13.00
Factory bundles	11.50 to	12.00
Dealers' bundles	11.00 to	11.50
Drop forge flashings...	10.50 to	11.00
No. 1 busheling	11.50 to	12.00
No. 2 busheling, old...	4.25 to	4.75
Rolled carwheels	15.00 to	15.50
Railroad tires, cut....	15.50 to	16.00
Railroad leaf springs..	15.50 to	16.00
Steel coup. & knuckles	14.00 to	14.50
Axle turnings	11.50 to	12.00
Coil springs	16.00 to	16.50
Axle turn. (elec.)	12.00 to	12.50
Low phos. punchings..	15.50 to	16.00
Low phos. plates 12 in. and under	15.50 to	16.00
Cast iron borings	5.50 to	6.00
Short shov. turn.	6.50 to	7.00
Machine shop turn....	5.50 to	6.00
Rerolling rails	17.00 to	17.50
Steel rails under 3 ft..	15.50 to	16.00
Steel rails under 2 ft..	16.00 to	16.50
Angle bars, steel	15.00 to	15.50
Cast iron carwheels...	13.00 to	13.50
Railroad malleable	14.00 to	14.50
Agric. malleable	10.00 to	10.50
	Per Net Ton	
Iron car axles	18.00 to	18.50
Steel car axles	18.50 to	19.00
Locomotive tires	15.50 to	16.00
Pipes and flues	8.50 to	9.00
No. 1 machinery cast.	12.00 to	12.50
Clean auto. cast.	11.50 to	12.00
No. 1 railroad cast....	11.00 to	11.50
No. 1 agric. cast.....	10.50 to	11.00
Stove plate	8.50 to	9.00
Grate bars	8.50 to	9.00
Brake shoes	9.50 to	10.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to	$14.50
No. 2 hvy. mltng. steel.	13.00 to	13.50
Low phos. plate	14.50 to	15.00
No. 1 busheling	13.00 to	13.50
Hydraulic bundles	13.50 to	14.00
Machine shop turn....	9.50 to	10.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$13.50 to	$14.00
No. 2 hvy. mltng. steel.	12.50 to	13.00
Comp. sheet steel	12.00 to	12.50
Light bund. stampings	9.00 to	9.50
Drop forge flashings..	10.00 to	10.50
Machine shop turn....	7.00 to	7.50
Short shov. turn.....	7.50 to	8.00
No. 1 busheling	11.00 to	11.50
Steel axle turnings....	10.00 to	10.50
Low phos. billet and bloom crops	17.00 to	17.50
Cast iron borings	7.75 to	8.25
Mixed bor. & turn....	7.75 to	8.25
No. 2 busheling	7.75 to	8.25
No. 1 cast	16.50 to	17.00
Railroad grate bars ..	9.50 to	10.00
Stove plate	10.00 to	10.50
Rails under 3 ft.....	18.50 to	19.00
Rails for rolling	17.00 to	17.50
Railroad malleable ...	15.00 to	15.50
Cast iron carwheels ..	14.00 to	14.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$14.00 to	$14.50
No. 2 hvy. mltng. steel.	12.00 to	12.50
Scrap rails	15.00 to	15.50
New hvy. bndled sheets	12.00 to	12.50
Old hydraul. bundles.	10.50 to	11.00
Drop forge flashings..	12.00 to	12.50
No. 1 busheling	12.00 to	12.50
Hvy. axle turnings....	10.50 to	11.00
Machine shop turn....	7.50 to	8.00
Knuckles & couplers..	16.50 to	17.00
Coil & leaf springs....	16.50 to	17.00
Rolled steel wheels....	16.00 to	16.50
Low phos. billet crops.	15.50 to	16.00
Shov. turnings	6.75 to	7.25
Mixed bor. & turn....	8.00 to	8.50
Cast iron borings.....	8.00 to	8.50
Steel car axles	16.50 to	17.00
No. 1 machinery cast.	15.50 to	16.00
No. 1 cupola cast.	14.50 to	15.00
Stove plate	13.00 to	13.50
Steel rails under 3 ft..	17.50 to	18.00
Cast iron carwheels...	13.50 to	14.00
Railroad malleable ...	14.50 to	15.00
Chemical borings	8.50 to	9.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$12.50 to	$13.00
No. 1 hvy. melting....	12.50 to	13.00
No. 2 hvy. melting....	11.50 to	12.00
No. 1 locomotive tires.	13.00 to	13.50
Misc. stand. sec. rails.	12.75 to	13.25
Railroad springs	14.00 to	15.00
Bundled sheets	8.00 to	8.50
No. 1 busheling	7.50 to	8.00
Cast. bor. & turn.....	3.50 to	4.00
Machine shop turn....	4.00 to	4.50
Heavy turnings	9.00 to	9.50
Rails for rolling	16.50 to	17.00
Steel car axles	17.50 to	18.00
No. 1 RR. wrought....	10.75 to	11.25
No. 2 RR. wrought....	12.00 to	12.50
Steel rails under 3 ft..	15.50 to	16.00
Steel angle bars	13.50 to	14.00
Cast iron carwheels...	13.75 to	14.25
No. 1 machinery cast..	14.25 to	14.75
Railroad malleable	12.00 to	12.50
No. 1 railroad cast....	11.00 to	11.50
Stove plate	9.00 to	9.50
Grate bars	8.50 to	9.00
Brake shoes	9.75 to	10.25

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$11.00 to	$11.50
No. 2 hvy. mltng. steel.	8.75 to	9.50
Scrap rails for mltng..	15.00 to	15.50
Loose sheet clippings.	6.50 to	7.00
Hydrau. b'ndled sheets	10.00 to	10.50
Cast iron borings	4.00 to	4.50
Machine shop turn....	5.25 to	5.75
No. 1 busheling	7.75 to	8.25
No. 2 busheling	2.50 to	3.00
Rails for rolling	17.00 to	17.50
No. 1 locomotive tires.	13.75 to	14.25
Short rails	17.50 to	18.00
Cast iron carwheels...	12.25 to	12.75
No. 1 machinery cast.	13.00 to	13.50
No. 1 railroad cast....	13.25 to	13.75
Burnt cast	6.75 to	7.25
Stove plate	6.75 to	7.25
Agricul. malleable	11.25 to	11.75
Railroad malleable	13.75 to	14.25
Mixed hvy. cast.	11.00 to	11.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel....	$12.50 to	$14.00
Scrap steel rails	14.50 to	15.00
Short shov. turnings..	7.50 to	8.10
Stove plate	9.00 to	10.00
Steel axles	15.00 to	16.00
Iron axles	15.00 to	16.00
No. 1 RR. wrought....	....	10.00
Rails for rolling	16.00 to	16.50
No. 1 cast	....	14.50
Tramcar wheels	....	14.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$10.00 to	$10.50
No. 2 hvy. mltng. steel.	8.50 to	9.00
Borings and turnings.	5.50 to	6.00
Long turnings	5.50 to	6.00
Short shov. turnings..	6.50 to	7.00
No. 1 machinery cast..	11.50 to	12.00
Automotive cast	12.50 to	13.00
Hvy. breakable cast...	9.00 to	9.50
Hydraul. comp. sheets.	11.75 to	12.25
Stove plate	8.00 to	8.50
New factory bushel...	10.75 to	11.25
Old No. 2 busheling..	3.00 to	3.50
Sheet clippings	9.00 to	9.50
Flashings	9.00 to	9.50
Low phos. plate scrap	11.75 to	12.25

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$10.00 to	$10.50
No. 2 hvy. mltng. steel	8.50 to	9.00
Hvy. breakable cast...	12.00 to	12.50
No. 1 machinery cast.	11.50 to	12.00
No. 2 cast	9.50 to	10.00
Stove plate	9.00 to	9.50
Steel car axles	20.00 to	20.50
Shafting	15.00 to	15.50
No. 1 RR. wrought....	11.00 to	11.50
No. 1 wrought long....	9.50 to	10.00
Spec. iron & steel pipe	8.50 to	9.00
Rails for rolling	16.00 to	16.50
Clean steel turnings*...	3.50 to	4.00
Cast borings*	3.00 to	3.50
No. 1 blast furnace...	3.00 to	3.50
Cast borings (chem.)..	9.50 to	10.00
Unprepared yard scrap	5.00 to	5.50
Light iron	3.00 to	3.50
Per gross ton, delivered local foundries:		
No. 1 machn. cast†....	$13.50 to	$14.00
No. 2 cast†	10.50 to	11.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.....	Nominal	
Scrap rails	Nominal	
No. 2 steel	Nominal	
Breakable cast	....	10.50
Machine shop turn.....	....	3.38
Mixed bor. & turn.....	2.00 to	2.25
Bun. skeleton long....	....	7.25
Shafting	10.25 to	10.50
Cast bor. chemical....	5.50 to	5.75
Per gross ton delivered consumers' yards:		
Textile cast	$12.50 to	$14.50
No. 1 machine cast....	12.50 to	14.50

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$12.50 to	$14.00
No. 2 hvy. mltng. steel.	11.50 to	13.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel.	$9.50	$9.00
No. 2 hvy. mltng. steel.	8.00	7.50
Mixed dealers steel...	7.00	6.50
Scrap pipe	5.50	5.00
Steel turnings	4.50	4.00
Cast borings	3.50	3.00
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	11.00	10.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges		
No. 1 hvy. mltng. steel.	....	$11.50
No. 2 hvy. mltng. steel.	....	10.00
No. 2 cast	....	11.00
Stove plate	10.00 to	10.50
Boston on cars at Army Base or Mystic Wharf		
No. 1 hvy. mltng. steel.	$13.25 to	$13.50
No. 2 hvy. mltng. steel.	12.25 to	12.50
Rails (scrap)	13.25 to	13.50
Philadelphia, delivered alongside boats, Port Richmond		
No. 1 hvy. mltng. steel.....	$14.00	
No. 2 hvy. mltng. steel.....	13.00	

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.25c.
Detroit, delivered	2.35c.
Duluth	2.35c.
Philadelphia delivered	2.57c.
New York	2.59c.
On cars dock Gulf ports	2.60c.
On cars dock Pacific ports	2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.10c.
On cars dock Tex. Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c. to 2.05c.
Detroit, delivered	2.00c. to 2.15c.
On cars dock Tex. Gulf ports	2.25c. to 2.40c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.75c. to 1.90c.
Detroit, delivered	1.85c. to 2.00c.
On cars dock Tex. Gulf ports	2.10c. to 2.25c.
On cars dock Pacific ports	2.35c.

Prices on reinforcing bars have been subject to concessions of $3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

	Base per Lb.
Pittsburgh, Buffalo, Cleveland, Chicago and Gary	2.70c.
Detroit	2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
*Philadelphia, del'd	2.15c.
*New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P't'g	3.80c.

*Eastern prices subject to occasional concessions of $2 a ton.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS**

PRICES F.O.B. UNLESS OTHERWISE NOTED

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.15c.
Detroit, delivered	2.25c.
Philadelphia, delivered	2.32c.
Granite City	2.25c.
On cars dock Pacific ports	2.65c.
Wrought iron, Pittsburgh	4.25c.

Cold Rolled**

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.20c.
Detroit, delivered	3.30c.
Granite City	3.30c.
Philadelphia, delivered	3.52c.
On cars dock Pacific ports	3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c above base

** The above are generally actual going prices, subject to change without notice and are $6 a ton below published prices announced recently for fourth quarter delivery.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron, Pittsburgh	6.10c.

Electrical Sheets

(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	4.95c.
Special Dynamo	5.65c.
Transformer	6.15c.
Transformer Special	7.15c.
Transformer Extra Special	7.65c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.95c.
F.o.b. cars dock Pacific ports	4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

Black Plate

Pittsburgh, Chicago and Gary	3.15c.
Granite City	3.25c.
On cars dock Pacific ports, boxed	4.10c.

NOTE: No. 29 gage is heaviest in which tin mill black plate is sold. No. 28 and heavier taking sheet base. There are no gages which take the above base prices as extras are applicable in all cases.

Tin Plate

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.35
Standard cokes, Granite City	5.45

Special Coated Manufacturing Ternes

	Per Base Box
Pittsburgh	$4.65
Gary	4.65
Granite City	4.75

Roofing Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

HOT ROLLED STRIP

Prices F.o.b. Unless Otherwise Noted

(*Widths up to 12 in.*)

	Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.

Cooperage Stock

Pittsburgh & Chicago	2.25c.

COLD ROLLED STRIP**

	Base per Lb
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown or Cleveland	3.10c.
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	.51- .75	4.30c.	4.50c.
Carbon	.76-1.00	6.15c.	6.35c.
Carbon	1.01 to 1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb.
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

*On galvanized wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.45
Coated nails	2.45
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Barbed wire, galvanized	3.20
Twisted barbless wire	3.20
Woven wire fence, base column.	67
Single loop bale ties, base col...	56

Note: Birmingham base same on above items, except spring wire.

Add $4 a ton for Mobile, Ala.; $5 for New Orleans; $6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are $1 a ton additional in each case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	56	36	¼ & ⅜	.+ 9	+30
¼ to ⅜	.59	43½	½	24	6½
½	....63½	54	¾	30	13
¾	....66½	58	1 & 1¼	..34	19
1 to 3	...68½	60½	1½	38	21½
			2	....37½	21

Lap Weld

2	61	52½	2	....30½	15
2½ & 3	..64	55½	2½ to 3½	31½	17½
3½ to 6	..66	57½	4	....33½	21
7 & 8	..65	55½	4½ to 8.32½		20
9 & 10	..64½	55	9 to 12	..28½	15
11 & 12	..63½	54			

Butt Weld, extra strong, plain ends

⅛	....54½	41½	¼ & ⅜	.+10	+43
½ to ⅜	..56½	45½	½	25	9
½	....61½	53½	¾	31	15
¾	....65½	57½	1 to 2	...38	22½
1 to 3	...67	60			

Lap Weld, extra strong, plain ends

2	59	51½	2	....33½	18½
2½ &	63	55½	2½ to	4.39	25½
3½ to	66½	59	4½ to	6.37½	24
7 &	8..65½	56	7 &	8..38½	24½
9 &	10..64½	55	9 to	12..32	20½
11 &	12..63½	54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 3 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d....13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d...13 B.W.G.	10.67	9.26	....
1½ in. o.d...13 B.W.G.	11.79	10.23	9.72
1¾ in. o.d...13 B.W.G.	13.42	11.64	11.06
2 in. o.d....13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d...13 B.W.G.	16.76	14.54	13.79
2½ in. o.d...12 B.W.G.	18.45	16.01	15.16
2¾ in. o.d...12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d...12 B.W.G.	21.42	18.59	17.54
3 in. o.d....12 B.W.G.	22.48	19.50	18.35
3½ in. o.d...11 B.W.G.	28.37	24.62	23.15
4 in. o.d....10 B.W.G.	35.20	30.54	28.66
4½ in. o.d...10 B.W.G.	43.04	37.35	35.22
5 in. o.d.... 9 B.W.G.	54.01	46.87	44.25
6 in. o.d.... 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham.	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles....	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $42, Birmingham, and $50 delivered Chicago and 4-in. pipe, $45, Birmingham, and $54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. & 6 in. and smaller.	65, 5 and 5*
Larger and longer up to 1 in.	60, 10 and 5*
1⅛ in. and larger	60, 5 and 5*
Lag bolts	60, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7	65, 5 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
½ in. and smaller	65 and 5
9/16 in. to 1 in. inclusive.	60, 5 and 5
1⅛ in. and larger	60 and 5

* Less carload lots and less than full container quantity. Less carloads lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
¼ to 7/16 in. incl.	65-10	70-5
½ to 9/16 in.	65-5	70
⅝ to 1-in. incl.	60-10	65
1⅛ in. and larger	60-5	60-5

Beyond the above, an additional 10 per cent allowed for full container quantities.

Stove bolts in packages, nuts attached	75
Stove bolts in packages, with nuts separate	75 and 12½
Stove bolts in bulk	85

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.40

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham .... 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head cap screws, 1 in. dia. and smaller	50 and 10
Milled square head set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	70 and 10
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	67½ and 10
Upset set screws, cup and oval points	75 and 10
Milled studs	60½ and 10

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.80c.
Delivered, Detroit	2.90c.
S.A.E. Series Numbers	Alloy Differential per 100 Lb.
200 (½% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½ Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£14 Nominal
Tin plate, per base box	20s. 3d. to 21s. 6d.
Steel bars, open hearth.	£11
Beams, open-hearth	£10 12s. 6d.
Channels, open-hearth	£10 17s. 6d.
Angles, open-hearth	£10 12s. 6d.
Black sheets, No. 24 gage.	£13
Galvanized sheets, No. 24 gage	£15 5s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheets ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 15s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	$22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown*	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa. Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	$22.00
F.o.b. Everett, Mass.	23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa. Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$25.00
Delivered Chicago	28.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$92.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$28.00
Domestic, 26 to 28%	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio
Per Gross Ton

10.00 to 10.50%	$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, 1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$92.75
2.50% carbon	97.75
2% carbon	102.75
1% carbon	112.75

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$2.00
Ferrotungsten, lots of 500 lbs. nominally	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots.	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports
Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore
Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	13c.
Iron, low phos., Swedish, average, 68½% iron	15c.
Iron, basic or foundry, Swedish, aver. 65% iron	13c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	35c.
Man., African, Indian, 44-48%	33c.
Man., African, Indian, 49-51%	35c.
Man., Brazilian, 46 to 48½%	33c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$20.00
Tungsten, domestic, scheelite delivered	$19.00 to $20.00

Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:

South African (low grade)	15.00
Rhodesian, 45%	19.50
Rhodesian, 48%	23.00
Turkish, 48-49%	23.50 to 24.50
Turkish, 45-46%	22.50
Turkish, 44%	18.00

Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:

50%	24.50 to 25.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	18.00
Domestic, f.o.b. Ohio River landing barges	18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	$18.00 to 19.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

No. 2 or diesel, f.o.b. Bayonne	4.125c.
No. 6, f.o.b. Bayonne	2.26c.
Del'd Chicago, No. 5 Bur. Stds.	3.25c.
Del'd Chicago, No. 6 Bur. Stds.	2.75c.
Del'd Cleve'd, No. 3 distillate	5.50c.
Del'd Cleve'd, No. 4 industrial	5.25c.
Del'd Cleve'd, No. 5 industrial	3.00c.
Del'd Cleve'd, No. 6 industrial	2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75
Foundry, f.o.b. Connellsville, Prompt	$4.75 to 5.50
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.46
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH

	Base per Lb.
Plates	3.55c.
Shapes	3.55c.
Soft steel bars and small shapes	3.60c.
**Reinforcing steel bars	2.70c.
Cold finished bars and screw stock	3.95c.
Hot rolled strip	3.75c.
Hot rolled sheets	3.50c.
Galv. sheets (24 ga.) 500 lb. to 1499 lb.	4.50c.
Wire, black, soft annealed	3.15c.
Wire, galv., soft	3.55c.
Track spikes (1 to 24 kegs)	3.75c.
Wire nails (in 100-lb. kegs)	2.65c.

On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb.
** On reinforcing bars base applies to orders of less than one ton and includes switching and carting charge.
All above prices for delivery within the Pittsburgh switching district.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.83c.
Structural shapes	3.75c.
Soft steel bars, round	3.94c.
Iron bars, Swed. charcoal	7.50 to 8.25c.
Cold-fin. shafting and screw stock:	
Rounds, squares, hexagons	4.39c.
Flats up to 12 in. wide	4.39c.
Cold-rolled strip, soft and quarter hard	3.66c.
Hot-rolled strip, soft O.H.	4.11c.
Hot-rolled sheets (10 ga.)	3.73c.
Galv. sheets (24 ga.)	4.60 to 4.85c.
Long ternes (24 ga.)	5.50 to 6.20c.
Cold-rolled sheets (20 ga.)	
Standard quality	4.90c.
Deep drawing	5.15c.
Stretcher leveled	5.50c.
SAE, 2300, hot-rolled	7.50c.
SAE, 3100, hot-rolled	6.10c.
SAE, 6100, hot-rolled annealed	10.25c.
SAE, 2300, cold-rolled	8.69c.
SAE, 3100, cold-rolled, annealed	7.29c.
Floor plate, ⅛ in. and heavier	5.43c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.65c.
Wire, galv. (No. 9)	5.00c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, per keg in 25 keg lots	$3.25

CHICAGO

	Base per Lb.
Plates and structural shapes	3.55c.
Soft steel bars, rounds and angles	3.60c.
Soft steel squares, hexagons, channels and Tees	3.75c.
Hot rolled strip	3.75c.
Floor plates	5.15c.
Hot rolled sheets	3.50c.
Galvanized sheets	4.50c.
Cold rolled sheets	4.45c.
Cold finished carbon bars	4.05c.

Above prices are subject to deductions and extras for quantity and are f.o.b. consumer's plant within Chicago free delivery zone.

CLEVELAND

	Base per Lb.
Plates	3.55c.
Structural shapes	3.73c.
Soft steel bars	3.50c.
Reinfor. bars (under 2000 lb.)†	2.55c.
Cold-fin. bars (1000 lb., over)	4.05c.
Hot-rolled strip	3.65c.
Cold rolled sheets	4.70c.
Cold-finished strip	3.35c.
Galvanized sheets (No. 24)	4.62c.
Hot-rolled sheets	3.50c.
Floor plates, 3/16 in. and heavier	5.33c.
*Black ann'l'd wire, per 100 lb.	$3.10
*No. 9 galv. wire, per 100 lb.	3.50
*Com. wire nails, base per keg	2.60
Hot rolled alloy steel (3100)	6.05c.
Cold rolled alloy steel (3115)	6.85c.

* For 5000 lb. or less
† 500 lb., base quantity.

Prices shown on hot rolled bars, strip, sheets, shapes and plates are for 400 to 1999 lb. Alloy steel, 1000 lb. and over; galvanized sheets, 150 to 1499 lb.; cold rolled sheets, 399 lb. and under.

ST. LOUIS

	Base per Lb.
Plates and structural shapes	3.82c.
Bars, soft steel (rounds and flats)	3.87c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.02c.
Cold fin. rounds, shafting, screw stock	4.32c.
Galv. sheets (24 ga.)	4.77c.
Hot rolled sheets	3.77c.
Galv. corrugated sheets, 24 ga. and heavier*	4.82c.
Structural rivets	5.02c.

* No. 26 and lighter take special prices.

BOSTON

	Base per Lb.
Structural shapes, 3 in. and larger	5.85c.
Plates, ¼ in. and heavier	3.85c.
Bars	3.98c.
Heavy hot rolled sheets	3.86c.
Hot rolled sheets	4.21c.
Hot rolled annealed sheets	4.76c.
Galvanized sheets	4.76c.
Cold rolled sheets	4.93c.

The following quantity differentials apply: Less than 100 lb., plus $1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb. minus 30c.; 40,000 lb. and over minus 40c.

BUFFALO

	Base per Lb.
Plates	3.77c.
Floor plates	5.40c.
Struc. shapes	3.55c.
Soft steel bars	3.60c.
Reinforcing bars (20,000 lb. or more)	2.05c.
Cold-fin. flats, squares, rounds, and hex.	4.05c.
Hot-rolled sheets, 3/16 x 14 in. to 48 in. wide incl. also sizes No. 8 to 30 ga.	3.50c.
Galv. sheets (24 ga.)	4.50c.
Bands and hoops	3.97c.

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	3.55
Bolts and nuts, per cent off list	60

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1, Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$47.50
Chicago District	56.05
Birmingham	47.50
Silica cement per net ton (Eastern)	8.55

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$47.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	47.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$67.00
Chemically bonded, f.o.b. Baltimore	57.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	40.00
Domestic, f.o.b. Chewelah Wash. (in bulk)	22.00

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.40c.
*Structural shapes	3.40c.
*Soft steel bars, small shapes, iron bars (except bands)	3.60c.
‡Reinforc. steel bars, square and deformed	2.61c.
Cold-finished steel bars	4.36c.
*Steel hoops	4.10c.
*Steel bands, No. 12 and 3/16 in. incl.	3.60c.
*Spring steel	4.75c.
†Hot-rolled anneal. sheets	3.40c.
†Galvanized sheets (No. 24)	4.50c.
*Diam. pat. floor plates, ¼ in.	5.00c.

These prices are for delivery in Philadelphia trucking area.
*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 25 bundles or over.
‡For one to five tons.

BIRMINGHAM

Bars and bar shapes	$3.85 base	
Structural shapes and plates	3.75 "	
Hot rolled sheets No. 10 ga.	3.80 "	
Hot rolled sheets No. 24 ga.	4.40 "	3500 lb. and over
Galvanized sheets No. 24 ga.	5.05 "	3500 lb. or more
Strip	4.05 "	
Reinforcing bars.	3.85 "	
Floor plates	5.96 "	
Cold finished bars	4.91 "	
Machine and carriage bolts	50 & 10 off list	
Rivets (structural)	$4.60 base	

On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.85c.	4.00c.	4.05c.
Shapes, standard	3.95c.	4.00c.	4.05c.
Soft steel bars	4.05c.	4.00c.	4.30c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.675c.	open.	2.975c.
Hot-rolled sheets (No. 10)	3.80c.	4.20c.	4.20c.
Galv. sheets (No. 24 and lighter)	5.15c.	5.05c.	5.50c.
Galv. sheets (No. 22 and heavier)	5.40c.	5.05c.	5.50c.
Cold-finished steel Rounds	6.55c.	6.60c.	7.10c.
Squares and hexagons	7.30c.	7.85c.	7.10c.
Flats	8.30c.	8.35c.	8.10c.
Common wire nails—base per keg less carload	$3.20	$3.05	$3.00

All items subject to differentials for quantity.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.83c.
Hot-rolled annealed sheets, No. 24	4.75c.
Galvanized sheets, No. 24	5.00c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

THIS WEEK'S MACHINE ...TOOL ACTIVITIES...

. . . Domestic orders showing a spotty improvement throughout the country . . . Army and Navy buying a large factor in present market . . . Sentiment as to future seems to be improved.

Volume of Small Orders Gaining in Cleveland Area

CLEVELAND—While the week has failed to bring any new large lists in this district, the volume of small orders has remained consistent. All in all, sellers are firm in the opinion domestic business has improved, although it is difficult to point specifically to any one particular class of industry buying in quantity. The foreign market has fallen off a little recently from the standpoint of orders. Sellers of used machinery have been able to dispose of an occasional machine here and there recently.

Mid-West Volume Improving From Miscellaneous Sources

CHICAGO—Some machine tool sales offices here report further improvement in sales and prospective business over the past week, but the betterment has not yet been general, according to others in the trade. Those experiencing increased activity find more individual orders for small tools and indications that a substantial amount of additional business is likely to be forthcoming in the next few weeks. One office reports radial drills and power presses as the best moving items currently, with other drilling and tapping equipment also going well. Sources of the demand are described as general. The Rock Island Arsenal in the past week placed orders for a 10-ft. radial drill and two horizontal boring and drilling machines. Although estimates of the margin of improvement are not available, equipment sellers are expecting October to extend the gains in sales volume registered in September and August.

October Volume Will Probably Gain Over September's

NEW YORK—Although machine tool business continues spotty in the Metropolitan area, the volume of machine tool orders placed in October will probably show a gain over that of the previous month. Unfortunately, however, the gain largely will be the result of business coming from Government sources, such as the Navy yards, or indirectly from firms having Government contracts, such as the aircraft industry. General manufacturing industry is still conspicuously absent from the market, with one exception, namely, sheet metal machinery. In the past week, some of the larger industrials have been buying shears and press brakes, whereas it has been only the smaller, sheet metal jobbers which have been interested in this class of machinery in recent months.

New and larger inquiries for machine tools have come in from Japanese buying agencies, but there is some doubt about much of this new business being placed since machinery already contracted for is being held up pending clarification of credit matters.

Betterment in Volume Seen at Pittsburgh

PITTSBURGH—From the low point in September, machine tool orders in this district are slightly more numerous, both as to number and money involved. Demand is miscellaneous, no one line being outstanding, and some transactions are the result of initial inquiries put out some time ago. Inquiries are holding up fairly well and are fully as active as a week ago. Domestic deliveries are still impeded somewhat in some lines by the volume of foreign business at factories. Steel mill equipment makers in this district experienced some support from contracts recently let by Youngstown Sheet & Tube Co. Miscellaneous steel mill equipment business is showing a slightly better trend.

Preliminary Plans Being Made for 1940 Models

DETROIT—Steadily brightening prospects for the automobile industry and concessions within the trade that 1939 will be a better year than had been anticipated are speeding plans for extensive changes in models to be produced in 1940. Preliminary plans have been formulated by most of the motor car manufacturers and it is believed that it will be only a matter of weeks before inquiries for machine tools will be seen at least in small volume.

Foreign Orders Lift Bookings By Cincinnati Builders

CINCINNATI—With lathes leading the way, machinery demand went upward the past week under impetus of a better foreign demand. Domestic ordering merely filled in the books, although local interests report this demand to be stable, giving a firm background to the present market. Current business is estimated at near to 50 per cent of capacity. Inquiry is a trifle better than heretofore and adds to market optimism toward future demand. One foreign buyer purchased 20 lathes, but other business was in one or two unit quantities. Heavy tools are unchanged in ordering, although inquiries indicate a fair amount of potential demand for these types.

. GREAT BRITAIN .

. . . Iron and steel business improving slowly . . . Export demand broadening.

LONDON, Oct. 25 (*By Cable*).—Continental steel demand is still good and the outlook is considered more favorable despite continuance of international uncertainty. Export demand is broadening, especially on ship plates for Holland and Norway, and sheets for China for which price concessions are now decreased.

British iron and steel business is improving slowly. Though there is little buying for next year, specifications against old contracts are coming in more freely.

Good results are expected from the London Motor Show. Some car makers are already arranging to speed up deliveries and increase output.

Steel makers are doubtful if prices will be reduced substantially owing to the recent increase in costs with lower output, but prices on coke, ore, and scrap are now well below the peak of 1937.

Steel-making pig iron is in an improved demand and the intensification of armament and defense programs is expected to involve large tonnages of structural steel.

Richard Thomas, Ltd., has started the new Ebbw Vale works on hot rolled strip. Continuous strip is expected to be in commercial production by mid-December.

The tin plate market is more active, especially in home trade, and unfilled orders are now a little under 2,500,000 base boxes. There is a strong demand for wasters, and excess stocks are small.

Black sheets are quiet but good future business is expected in motor sheets.

Ohio State Offers New Welding Course

A NEW curriculum in Ohio State University's college of engineering leading to a degree in welding engineering, has been announced. Investigations by a committee of department chairmen, in consultation with industrial representatives, reveals a good demand for men with the specific training to be offered in the new welding curriculum.

Administration of the curriculum will be under the department of industrial engineering.

Theoretical Research Features A.I.M.E. Program

(CONTINUED FROM PAGE 41)

sufficiently distinct in duralumin to result in three-step hardening. During the room-temperature aging of duralumin the hardening is essentially due to nucleus formation. Any actual precipitation that may occur at room temperature is incidental and not a vital factor in the hardening mechanism.

It was suggested that this combination of nucleus formation, localized precipitation and general precipitation offers a comprehensive picture of the age-hardening process. Many modifications of this three-stage process are possible, according to the author. For example, an aging system that undergoes uniform precipitation represents a special (and perhaps very rare) case in which there is no localized precipitation. Such an alloy would exhibit a two-stage hardening process, owing to nucleus formation and general precipitation. On the other hand, if the alloy is highly susceptible to plastic deformation during quenching, the localized precipitation stage may be emphasized because of the accelerated precipitation along the slip or twining planes as well as at the grain boundaries. It is also conceivable that in some alloys localized precipitation may set in so rapidly that it obscures the evidence of the pre-precipitation stage in regions where general precipitation will eventually occur. This should result in two-stage hardening due to localized and then general precipitation although both precipitates are actually preceded by nucleus formation. Finally, if the precipitation is very nonuniform, the effects of the individual stages may overlap to such an extent that only a single hardness peak is found. One may visualize many additional variations and combinations of these processes.

Thus according to Mr. Cohen, the occurrence of one, two or three hardening stages in the aging curves of alloy systems may all be explained on the basis of the general mechanism herein presented for the age-hardening of duralumin.

Slide-Rule Simplifies Equipment Purchase Calculations

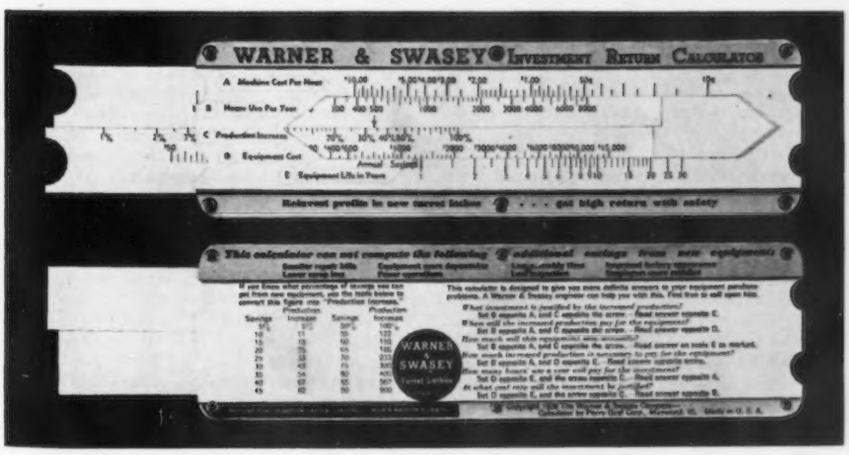
A SLIDE-RULE recently developed by a sales engineer of the Warner & Swasey Co., Cleveland, to simplify the calculation of profit possibilities in equipment purchases is shown in the accompanying illustration.

Whether an investment in new equipment is justified—either for the shop or the "front office"—generally depends on such factors as its cost, the increased production possible with it, the number of hours use per year, the machine cost per hour, and its useful length of life. Equipped with five scales, three of them movable, the new slide-rule permits rapid calculation of any one of the foregoing factors when the others are known or can be approximated.

Suppose the purchase of a new turret lathe costing $5,000 is being considered. There is enough work to keep the new machine operating 2,600 hr. per year. Machine operating cost is $1.50 per hr. and the new machine will increase production 33⅓ per cent. How long will it take the machine to pay for itself, and how much will it save annually? Setting up the known factors on the slide-rule (see illustration), it is a matter of seconds to find that the new turret lathe will pay for itself in less than 4 yr., earning almost $1,300 annually.

Suppose the equipment being considered is a new jig which will cost $750 and must be written off in 2 yr. A 50 per cent production increase is possible. Machine cost is $1.25 per hr. Slide-rule calculation indicates that no less than 600 hr. use a year will be required to make the jig pay for itself.

Front and back views of the Warner & Swasey slide-rule calculator set to solve a typical equipment buying problem.


WARNER & SWASEY Investment Return Calculator
A Machine Cost Per Hour
B Hours Use Per Year
C Production Increase
D Equipment Cost
E Equipment Life in Years
Relevant profits in new curved indow
. . . get high return with safety
This calculator can not compute the following
additional savings from new equipment
WARNER & SWASEY
Turret Lathes

Navy Inquires for Submarine Tender Steel

WASHINGTON.—The Navy Department has issued schedules for 5520 tons of plates, sheets, angles, shapes, bars and strips for the submarine tender Fulton at the Mare Island, Cal., Navy Yard. The largest inquiry covers 4693 tons of plates, sheets and strips, bids on which will be opened on Nov. 4. Also on that date bids will be opened for 650 tons of angles and shapes and 76 tons of half-oval bars and strips. On Nov. 15 bids will be opened for 101 tons of rivet bars.

New Glass for Viewing Open-hearth Operation

DEVELOPMENT for the first time of a standardized ground and polished cobalt blue glass to view open-hearth furnace operations was announced by H. R. Moulton, assistant research director of the American Optical Co., Southbridge, Mass. This improved glass, he stated, materially reduces eyestrain of steel workers and assists in the production of a superior quality of steel.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Standard Oil Co. of New Jersey, 26 Broadway, New York, has approved plans for addition to steel tank storage division at refinery at Constable Hook, Bayonne, N. J., including nine new tank units, from 40 to 12 ft. in diameter, and 30 to 40 ft. high, pipe lines and one-story steel drum building. Cost over $50,000. Work will be carried out by company forces.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Nov. 14 for 23,830 ft. of telephone cable, and 12,666 ft. of cable, with 28 reels (Circular 72); rewinder reel attachments, tape reels, pullers, tape bridges, etc. (Circular 73).

Potter Tool & Machine Works, 79 East 130th Street, New York, has leased space in building at 1916-38 Park Avenue for expansion.

Cities Service Oil Co., 70 Pine Street, New York, has authorized immediate rebuilding of part of storage and distributing division at oil refinery at Tremley Point, Linden, N. J., recently destroyed by fire, with loss estimated at $500,000, including 21 steel tanks, pipe lines and other facilities. J. S. Cordell is vice-president and general manager.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for relief valves (Schedule 4689) for Brooklyn Navy Yard; 14 engine lathes, turret and cap type, with spare parts (Schedule 4663), eight winches, with mechanical and electrical spare parts (Schedule 4673); until Nov. 8, circuit breaker and tumbler type switches (Schedule 4734) for Brooklyn and Philadelphia yards.

Consolidated Cork Corp., 55 Bogart Street, Brooklyn, manufacturer of bottle caps, etc., has leased about 100,000 sq. ft. of floor space in Bush Terminal building, foot of Forty-third Street, for plant and will remove to new location and increase production.

Central School District, Delhi, N. Y., plans manual training department in new three-story high school, for which bids will be asked soon on general contract. Cost about $675,000. Financing has been arranged through Federal aid. Elwyn E. Seelye & Co., 101 Park Avenue, New York, are engineers.

Staso Milling Co., 332 South Michigan Avenue, Chicago, manufacturer of mineral granules for surfacing roofing, siding, etc., plans new plant at Somerville, N. J., comprising nine one-story buildings. Cost over $200,000 with pulverizing, milling, mixing and other machinery. Austin Co., Cleveland, and 19 Rector Street, New York, is architect and contractor.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Nov. 14 for seamless steel tubing (Circular 316).

Lower Camden County Regional High School Board, Camden, N. J., plans manual training department in new multi-story high school at Lindenwold, N. J., for which bids will be asked soon on general contract. Tract of 63 acres has been acquired for site. Cost about $891,000, of which $575,000 has been secured through Federal grant and remainder a bond issue, recently voted.

Board of Borough Commissioners, City Hall, Vineland, N. J., Robert E. Beakley, clerk, asks bids until Nov. 3 for extensions and improvements in municipal power plant and waterworks station, including new 800-hp. steam generating unit and equipment, steel stack, etc. Schofield Engineering Co., Commercial Trust Building, Philadelphia, is consulting engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for one motor-driven band saw (Schedule 4675) for Philadelphia Navy Yard.

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to Ralph S. Herzog, 1505 Race Street, Philadelphia, for one-story addition to machine shop at local navy yard, at $254,477 exclusive of equipment.

E. I. duPont de Nemours & Co., Rayon Division, duPont Building, Wilmington, Del., has acquired about 340 acres near town limits of Seaford, Del., fronting on Nanticoke River, for new mill, for which plans will be drawn at once. It will include power house, pumping plant, machine shop and other mechanical departments. Cost about $7,000,000 with machinery. Company engineering department, first noted address, is in charge.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Nov. 9 for six vertical presses (Circular 348); until Nov. 14, two tractor bullet charging machines, caliber 0.50 (Circular 335).

BUFFALO DISTRICT

Eastman Kodak Co., Rochester, N. Y., has let general contract to A. W. Hopeman & Sons Co., 569 Lyell Avenue, for six-story and basement addition to main camera works on Plymouth Avenue, 250 x 300 ft. Cost over $550,000 with equipment.

North American Electric Appliance Co., Inc., Buffalo, N. Y., recently organized, will operate a plant at 42 Pearl Street, where property has been leased, specializing in production of electric heaters and parts, airplane wing defrosters, etc. Gerritt Van Daam is president.

Board of Education, Blasdell, N. Y., plans manual training department in new two-story junior and senior high school. Cost about $300,000. Financing has been arranged. Bley & Lyman, 505 Delaware Avenue, Buffalo, are architects, and Thomas H. McKaig, same address, engineer.

WASHINGTON DIST.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Nov. 14 for 960 different automobile parts (Circular 398-22).

Royal Crown Bottling Co., 328 East Preston Street, Baltimore, has let general contract to Franklin Construction Co., 207 West Franklin Street, for one-story mechanical-bottling plant. Cost over $45,000 with equipment.

United States Engineer Office, Post Office and Courthouse, Norfolk, Va., asks bids until Nov. 16 for one extension bed gap lathe, 18-36 in. by 10 ft. (Circular 43).

Warden, Federal Reformatory, Petersburg Camp, Petersburg, Va., asks bids until Nov. 1 for three sets of steel blades with bolts and nuts for shovel mixer (Circular 181), valve seats and valve with pins for steam traps (Circular 183), 2-in. malleable iron flange unions (Circular 182).

Board of Education, Portsmouth, Va., has let general contract to R. R. Richardson & Co., National Bank of Commerce Building, Norfolk, for one-story vocational shop in conjunction with gymnasium at Woodrow Wilson High School, at $114,494 exclusive of equipment. J. Binford Walford, 103 East Cary Street, Richmond, Va., is architect.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Nov. 1 for 10,500 to 31,000 wire springs, cadmium coated (Circular 133).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for one lathe (Schedule 4511) for Alexandria, Va., yard; metal-cutting nibbling machine (Schedule 4683), 28-in. heavy-duty shaper (Schedule 4679), metal spinning lathe, with accessories (Schedule 4680), 10 heavy-duty lathes (Schedule 4681), metal-cutting bandsaw (Schedule 4682); until Nov. 4, vertical boring machine (Schedule 4715) for Portsmouth, N. H., Navy Yard; surface grinder (Schedule 4702), grinding machine (Schedule 4699) for Newport, R. I., Naval Air Station; six milling machines and equipment (Schedule 4725), one milling machine (Schedule 4720) for Washington yard, all machines to be motor-driven; fuel oil service pumps (Schedule 4550) for Eastern and Western yards.

NEW ENGLAND

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Nov. 1 for end mills, shank cutters, hollow mills, etc. (Circular 115); until Nov. 4, one horizontal hydraulic broaching machine (Schedule 98), two drilling and reaming machines (Circular 101); until Nov. 7, one set of progressive dies for bending and forming cartridge clips (Circular 106), eight motor-driven automatic small milling machines (Circular 105), two portable die tables, hydraulic elevating-type, with hand-operated double-acting pump, horizontal pump handle, four swivel casters, with drop-forged wheels (Circular 110), three automatic lathes with equipment (Circular 112); until Nov. 8, one blast-cleaning cabinet (Circular 111).

Boston Elevated Railway Co., 31 St. James Avenue, Boston, has let general contract to James Stewart & Co., 230 Park Avenue, New York, and Statler Building, Boston, for superstructure for one-story and basement machine shop at Everett, Mass., part of unit to be used for office and operating service. Cost over $1,000,000 with equipment. A. J. Blackburn, first noted address, is company architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for two mechanically-operated snow loaders, one on crawler treads and other on pneumatic-tired wheels (Schedule 4654) for Brooklyn and Boston Navy yards; until Nov. 4, one motor-driven plate-bending roll (Schedule 4718) for Boston yard.

SOUTH ATLANTIC

City Council, High Point, N. C., has arranged for Federal financing in amount of $6,492,600, of which $2,921,600 will be a grant, for new municipal hydroelectric power plant on Yadkin River, near Winston-Salem, N. C., to include power dam, generating station with initial capacity of 24,000-kw., power substations, transmission line to city limits, where connection will be made with new power substation, and other operating facilities. Charles T. Main, Inc., 201 Devonshire Street, Boston, is consulting engineer; E. M. Knox is city manager.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Benning, Ga., asks bids until Oct. 31 for railway supplies, including cast iron car wheels, brake beams, steel boiler tubes, wedges, driving springs, air brake parts, safety valves, combination boiler check and stop valves, etc. (Circular 148-38).

SOUTH CENTRAL

Arkansas Fuel Oil Co., Bossier City, La., has let contract to Alco Products, Inc., Dunkirk, N. Y., for expansion and improvements in Loreco oil refinery. Work will include new polymerization plant unit, gasoline cracking unit, furnaces for increasing heat input to topping division and other work. Steel tank storage division also will be increased. Cost about $950,000 with equipment.

Town Council, Thibodaux, La., asks bids until Nov. 1 for extensions and improvements in municipal electric power plant, including additional equipment. Cost about $80,000. Financing has been arranged through Federal aid.

Tennessee Valley Authority, Knoxville, Tenn., is considering new phosphate plant on about 535-acre tract in Williamson County, near Franklin, Tenn., for commercial fertilizer production, to include furnace units, phosphate mining equipment and other operating facilities. Plant and furnaces will be electric-

operated, power supply to be secured from lines of TVA in that area. Cost about $500,000 with equipment.

SOUTHWEST

City Council, Vandalia, Mo., asks bids until Oct. 31 for new municipal electric power plant as follows: Building and structures (Section 1), deep-well pumping machinery and auxiliary equipment (Section 2), three diesel engine-generator units with accessories, fuel oil storage tanks, cooling tower, piping and auxiliary equipment (Section 3), electrical distribution lines (Section 4). Cost about $165,000. Financing in that amount has been arranged. W. A. Fuller & Co., 2916 Shenandoah Avenue, St. Louis, are consulting engineers.

Crossett Paper Mills, Crossett, Ark., has let general contract to Rust Engineering Co., Clark Building, Pittsburgh, for several one and two-story buildings for different divisions of production, with two-story extension, 64 x 130 ft., to finishing division; also extensions to power house, with installation of new boiler unit, turbo-generator and auxiliary equipment. Cost about $750,000.

Johnston Tin Foil & Metal Co., 6106 South Broadway, St. Louis, has let general contract to Woermann Construction Co., 3800 West Pine Boulevard, for one-story addition, 100 x 100 ft. Cost over $50,000 with equipment. O'Meara & Hills, 5709 Waterman Street, are architects.

Board of Trustees, Oklahoma Agricultural and Mechanical College, Stillwater, Okla., plans new steam-electric power plant for power and central-heating service. Cost about $675,000, of which $303,750 will be a Federal grant. Phillips A. Wilber, Mechanical College division, is engineer.

Oliver Armature Works, 2505 Capitol Street, Houston, Tex., armatures and other electrical equipment, has let general contract to Oliver & Walkenshaw Co., Houston, for new one-story plant at 610 Live Oak Avenue. Cost about $45,000 with equipment. S. R. Slaughter, 1114 Capitol Street, is architect.

City Council, Robstown, Tex., has concluded financing, through bond issue and Federal aid, for new municipal electric power plant, using diesel engine-generator units and auxiliaries. Cost about $274,000, including distributing system. Garrett Engineering Co., Houston, Tex., is consulting engineer.

WESTERN PA. DIST.

Red House Mfg. Co., Inc., Red House Farms, Eleanor, W. Va., plans steam power house at new one-story textile mill, 96 x 317 ft., at local Federal homestead project. An air-conditioning system, conveyors and other equipment will be installed. Bids have been asked on general contract. Cost over $100,000 exclusive of equipment. Financing has been arranged through Farm Security Administration. Alfred M. Marks, 541 Wood Street, Pittsburgh, is architect.

United States Engineer Office, Huntington, W. Va., asks bids until Oct. 31 for machine screws, set screws, cap screws, expansion screw anchors, etc. (Circular 98).

Doddridge County Board of Education, West Union, W. Va., William Rollins, superintendent, plans manual training department in new two-story high school. Cost about $200,000, of which $95,000 will represent a Federal grant.

OHIO AND INDIANA

Enamel Products Co., Eddy Road and Taft Avenue, Cleveland, has let general contract to Peck & Udell, 2341 Carnegie Avenue, for one-story addition, 117 x 130 ft., for storage and distribution. Cost close to $50,000 with equipment. F. W. Mettler, 999 Rushleigh Avenue Avenue, is engineer.

Robert Mitchell Mfg. Co., Second and John Streets, Cincinnati, manufacturer of radio equipment and parts, plans rebuilding part of plant recently destroyed by fire. Loss over $65,000 with equipment.

City Council, Bellevue, Ohio, plans new municipal electric power plant. Cost about $680,000 with equipment. Financing is being arranged through Federal aid. Western Construction & Engineering Co., Nicholas Building, Toledo, Ohio, is consulting engineer.

Contracting Officer, Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Oct. 31 for 5700 ft. of seamless steel tubing, chrome molybdenum (Circular 256), fuel regulator assemblies, fuel pump assemblies, hydraulic generator assemblies (Circular 238), one electric heat-treating furnace (Circular 257), control communication lamp assemblies (Circular 270), 20 landing gear and flap operating motor assemblies (Circular 240); until Nov. 1, 2200 bomb hoist pulleys (Circular 265), electric paper-drilling machine, set of hollow steel paper drills, electric plate graining machine (Circular 250), 14,842 electrical connector plug assemblies, 1626 light cable instrument adapter assemblies, 704 lamp cable instrument adapter assemblies, 200 right-angle conduit elbow assemblies (Circular 262); until Nov. 2, 35,000 ft. of ⅛-in. flexible conduit (Circular 254), about 6000 lubricators (Circular 266), 500 generator terminal housing assemblies (Circular 255); until Nov. 3, 32 2-gal. pressure-feed oil tanks, and 52 oil spray guns (Circular 275).

Sunbeam Electric Mfg. Co., Evansville, Ind., manufacturer of automobile headlights and other electrical products, has let general contract to Tri-State Contracting Co., 1525 Shanklin Avenue, for one-story addition, 125 x 150 ft., for storage and distribution. Cost over $50,000 with equipment.

MICHIGAN DISTRICT

Ford Motor Co., Dearborn, Mich., has let general contract to Weitz Co., 713 Mulberry Street, Des Moines, Iowa, for alterations and improvements in branch assembling plant at Des Moines. Cost about $45,000 with equipment.

Diamond Screw Products Co., 4550 Maybury Avenue, Detroit, has purchased former plant of Regent Stove Co., Wyandotte, Mich., and will improve for new works.

Chrysler Corp., 341 Massachusetts Avenue, Detroit, has taken title to about 65 acres near East town limits at Newark, Del., for new factory branch, storage and distributing plant, with parts division, for which plans will be drawn soon. Cost close to $250,000 with equipment.

City Council, Frankfort, Mich., plans new municipal electric power plant. Cost close to $60,000. Financing has been arranged through Federal aid. Ayres, Lewis, Norris & May, Ann Arbor, Mich., are consulting engineers.

State Budget Director, Lansing, Mich., has asked bids on general contract for addition to power plant at State hospital, Ypsilanti, Mich. Cost over $50,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

MIDDLE WEST

Wilson & Co., Inc., Union Stock Yards, Chicago, plans new plant at St. Boniface, Man., comprising main one and multi-story unit, with auxiliary buildings, power house, machine shop and other mechanical departments. Cost close to $175,000 with equipment.

John W. Droll Co., 351-63 East Ohio Street, Chicago, manufacturer of tools and dies, light machinery, etc., has leased additional space in building at location noted, increasing floor area from 19,000 to 26,000 sq. ft., for expansion.

Allied Oil Co., St. Elmo, Ill., plans rebuilding part of local oil refinery recently damaged by fire. Loss over $200,000, with 10 steel storage tanks and other equipment.

Board of Education, Colorado Springs, Colo., School District No. 11, plans manual training equipment in new three-story high school, for which a bond issue of $275,000 has been approved, to be supplemented by Federal aid to make total fund of $500,000. Edward L. Bunts, First National Bank Building, Colorado Springs, is architect; Burnham Hoyt, Colorado National Bank Building, Denver, is consulting architect.

Supervising Construction Engineer, Fratt Building, Billings, Mont., office of Department of Interior, asks bids until Oct. 31 for 100-kw. diesel engine-generating set for installation at Rosebud, S. D.

City Council, Hartington, Neb., plans new municipal electric power plant, with diesel engine-generator units and auxiliary equipment. Cost about $115,000. Financing in part is being arranged through Federal aid. H. H. Henningson Engineering Co., Union State Bank Building, Omaha, Neb., is consulting engineer.

Tungston Spark Plug Mfg. Co., 1402 South Michigan Avenue, Chicago, has leased a floor in building at 1418 South Wabash Avenue, about 9000 sq. ft., for plant.

Fellenz Coal & Dock Co., Milwaukee, has purchased 13.2 acres of frontage along South Menomonee canal for a new coal handling plant, with hoppers, cranes and other machinery for rail trans-shipment of fuel delivered by self-unloading Great Lakes vessels. T. Newton Moore is president and general manager.

Kearney & Trecker Corp., 6771 West National Avenue, West Allis, Milwaukee, has placed contracts for an addition, 23 x 62 ft., to pipe shop and boiler room. John Menge, Jr., 108 West Wells Street, Milwaukee, is architect.

PACIFIC COAST

General Metals Corp., 5701 South Boyle Avenue, Vernon, Los Angeles, manufacturer of oil well equipment and supplies, has let general contract to W. A. Brunet, Shell Building, Houston, Tex., for one-story branch plant near Crosby and Homestead Roads, Houston, comprising foundry, forge shop and office units. Cost about $125,000 with equipment.

Imperial Irrigation District, El Centro, Cal., has voted bonds for $1,045,000, to which will be added a Federal grant of $855,000, for new hydroelectric power plant at drop No. 4, All-American Canal; also for two new engine-generator units in power plant at Brawley, Cal., used for standby service; and for about 1000 miles of electrical distribution lines in different parts of valley. M. J. Dowd, Imperial, Cal., is chief engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for one turret saddle-type lathe (Schedule 4630), one selective head lathe, both motor-driven (Schedule 4633), for San Pedro, Los Angeles, naval station.

Humphrey Supply Co., Reno, Nev., meat packer, has approved plans for one-story plant unit, for which superstructure will begin at once. Cost about $55,000 with equipment.

San Carlos Irrigation and Drainage District, Coolidge, Ariz., plans new hydroelectric power plant at Butte power site at junction of Gila and San Pedro Rivers, near Florence, Ariz., to include power dam, generating station, transmission lines, power substations and other operating structures. Fund of $5,119,000 has been approved, to which will be added a Federal grant of $2,303,000, making total appropriation of $7,422,000 for project.

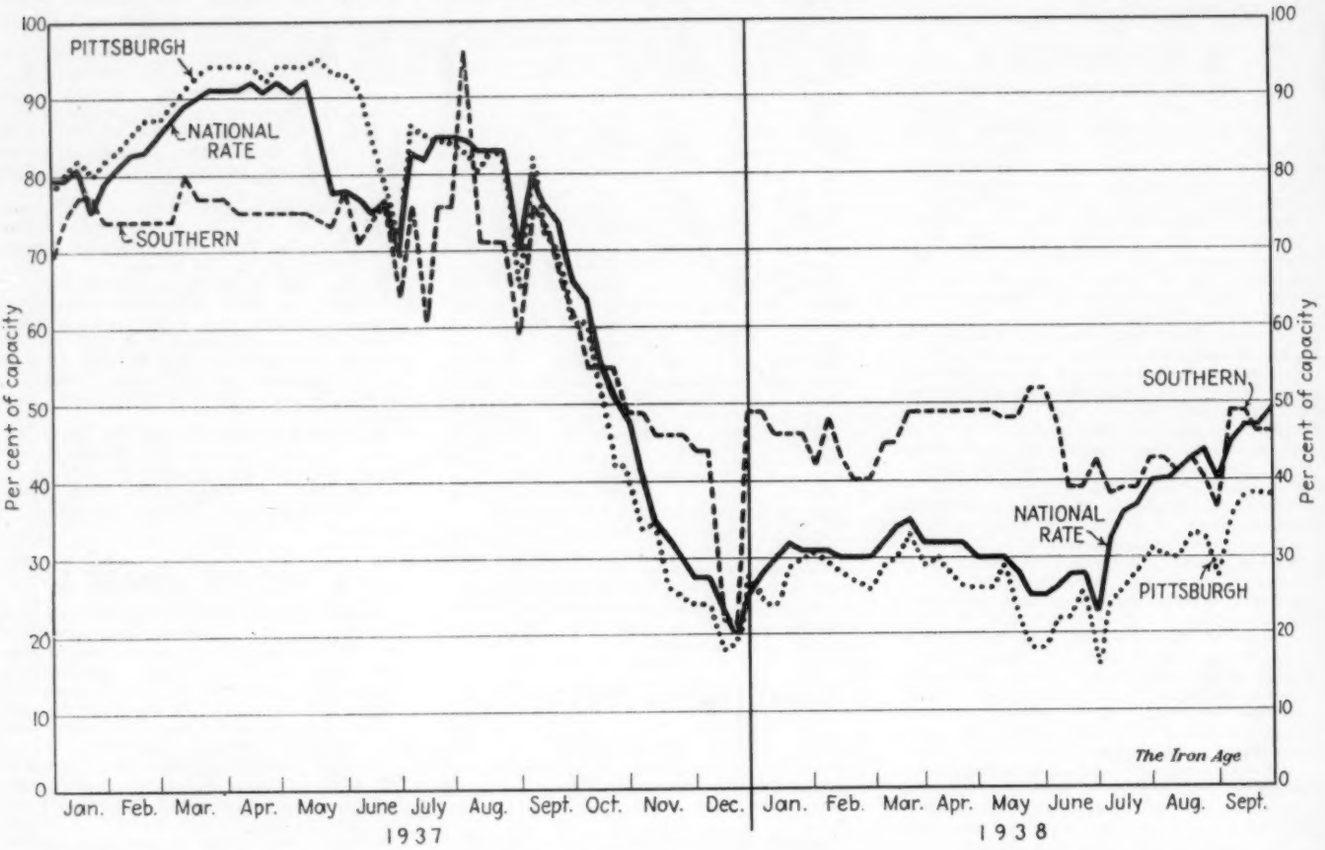
Salinas City School District, Salinas, Cal., has let general contract to F. S. Stolte, 1405 San Antonio Avenue, Alameda, Cal., for one-story manual training shop addition to Washington school. Cost about $40,000. Charles E. Bruner, 7 Windham Street, Salinas, is architect.

FOREIGN

Imperial Chemical Industries of Australia and New Zealand, Ltd., Melbourne, Victoria, Australia, plans new plant at Deer Park, near Sunshine, Victoria, consisting of one and multi-story units and shops for production of nitric acid, synthetic ammonia, etc. Work is scheduled to begin early in 1939. Cost over $2,000,000 with equipment. G. Robb, formerly manager of company ammunition plant, will be in charge of erection.

Arthur Sicard, Ltd., 1805 Bennett Avenue, Montreal, Que., manufacturer of snow plows and other road equipment, has approved plans for one-story plant on Aird Avenue. Cost close to $50,000 with equipment.

A Comparison of Ingot Production Rates in the Southern and Pittsburgh Districts



AS the chart published herewith illustrates, the rate of ingot production in the South, based on the per cent of capacity operated, has been running consistently higher than the Pittsburgh district's rate since the first of the current year. In September of this year, the South, operating at an average of 45 per cent of capacity, was producing ingots at the rate of 1,102,500 tons a year, while furnaces in the Pittsburgh area, operating at 35 per cent, were turning out ingots at the rate of 5,242,600 tons a year. The South's ingot producing facilities represents 3.3 per cent of the nation's capacity, while the Pittsburgh district accounts for 24 per cent.

The recent improvement in the activities of the manufacturing and construction industries, the two industries which are so vital to the prosperity of the Pittsburgh district, is reflected in the gradual reduction of the spread between the rates of the two districts. From July 12 to Oct. 18 of this year the Pittsburgh rate has advanced from 24 per cent to 39 per cent, or a gain of 62 per cent, while the South's rate has risen from 38.5 per cent to 49 per cent.

The relatively greater dependence of the Pittsburgh area on the construction industry is indicated by the fact that while the ratio of ingot capacity of Pittsburgh to the South is 6.1 to 1, the ratio of structural shape capacity is 27 to 1. On the other hand, the importance of agricultural outlets to the South's steel industry is shown by the ratio of the Pittsburgh district's galvanized sheet and long terne capacity to the South of 1.2 to 1, and in wire and wire products of 2.7 to 1.

PICTURED here is a mobile display of Lake City Malleable Co.'s malleable casting products installed by J. H. Redhead, president, as a move to increase business. Demonstrations of tensile strength can be made in the trailer. "We concluded that business wasn't going to get any better if we just sat around and grouched about it," said R. C. Shurmer, sales manager of the Cleveland Company.